GAME MEAT PRODUCTION IN THE XHARIEP DISTRICT OF THE FREE STATE PROVINCE: EVALUATING AND OPTIMISING RESOURCES

by

WALTER DERBYSHIRE

Dissertation submitted in fulfilment of the requirements for the degree:

DOCTOR TECHNOLOGIAE:
ENVIRONMENTAL HEALTH

in the

School of Agriculture and Environmental Sciences

Faculty of Health and Environmental Sciences

CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE

2011

Promoter: Prof. JFR Lues
Co-promoter: Prof. P Venter

DEDICATION

To my wife, Sandra

and

children, Shaun and Lyndall

With love

DECLARATION OF INDEPENDENT WORK

I, WALTER DERBYSHIRE, hereby declare that this research project, submitted in fulfilment of the degree DOCTOR TECHNOLOGIAE: ENVIRONMENTAL HEALTH, is my own independent work and has not been submitted before to any institution by me or anyone else as part of any qualification. Where references have been made and quoted, authors are duly acknowledged in the text.

23 August 2011

W DERBYSHIRE **DATE**

ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to the following:

- Professor JFR Lues (School of Agriculture and Environmental Sciences, Central University of Technology, Free State) for his expertise and guidance;

- Professor P Venter (School of Agriculture and Environmental Sciences, Central University of Technology, Free State) for his specialised input;

- Ms Ina Bester (statistician) for her expert advice throughout the study;

- Central University of Technology, Free State (CUT) for the funding of this study through the Grants Award Fund;

- My wife and children for their inspiration, patience and encouragement, without which the study would not have been possible;

- My late mother, who would have been proud of me after being so dedicated in helping me complete my schooling career successfully;

- Dr Sarah Mutsinze for her encouragement and support; and

- Finally, our Almighty Father for His grace and talents received.

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ABSTRACT

In addition to one national park and six nature reserves, the Free State Province boasts several privately owned game reserves, as well as game farmers and commercial stock farmers who keep game. A survey conducted in 1985 showed that the majority of game could be found in the Xhariep District situated in the southern and south-western parts of the province. Game export abattoirs and processing facilities are situated in provinces other than the Free State, which results not only in an outflow of game carcasses for export purposes, but also a loss of employment opportunities and opportunities for the generation of foreign currency from a district (Xhariep) which, from a socio-economic perspective, is seen as deprived. There are 21 non-export high-throughput red meat abattoirs in the province, posing the question as to whether these could be used for the slaughtering of game. This study aimed firstly to compile guidelines for the wild game meat industry regarding the production of wild game meat for the international market and to assess wild game production and utilisation in the Xhariep District through a comprehensive survey of game farming practices, game numbers and species, as well as the utilisation of game through various consumptive and non-consumptive methods. A further aim was to investigate practices at existing slaughter facilities in order to determine their potential to be adapted into wild game meat export facilities and assess such potential via a standardised protocol. The research commenced with an investigation into processing and export requirements for wild game meat in South Africa through a literature study of all EU legislation, directives and other relevant literature on the subject, and provides comprehensive reference material for entrepreneurs and developers in the wild game meat industry. Methodologies utilised included audits to determine the extent to which abattoirs conform to the structural, operational and documentation meat hygiene requirements followed by the development of a novel assessment matrix for measuring the level of compliance of existing abattoirs and their potential to be developed into European Union (EU) export facilities. The survey of the Xhariep area concluded that a significant potential exists for the expansion of the game industry, as several

respondents indicated that they were interested in expanding their game production and that they had land available for this purpose. A further indication was that the game would be highly marketable because it was free ranging and could be regarded as organic due to the absence or controlled use of additives and pesticides that could result in chemical residues in the meat. The establishment of a wild game export facility was favoured by nearly 70% of the respondents. The hygiene evaluation of existing slaughter facilities in the Free State Province resulted in six slaughtering facilities being rated as good or excellent, demonstrating the potential to successfully process game meat for the export market. This was tested by utilising the proposed evaluation matrix, which rated the abattoirs most suited to be adapted into game meat processing facilities for export purposes. The value of this approach lies in the fact that it is not only restricted to local markets, but can be utilised internationally by the abattoir industry, as well as the fact that it is not species specific. It should, however, be applied objectively by knowledgeable operators in the industry. It is concluded that institutions in the Free State Province possess the knowledge and ability to not only produce wild game meat, but also to successfully process this commodity through the optimal utilisation of existing high-throughput red meat abattoirs. By utilising existing management skills and affecting relatively minimal adjustments to existing structures, these resources should be utilised to successfully enter the wild game meat export market which should, in turn contribute towards the prosperity of the Xhariep District.

Chapter 1

BACKGROUND AND RATIONALE

1.1 INTRODUCTION

HISTORICAL OVERVIEW OF GAME FARMING, GAME UTILISATION AND GAME MARKETING IN SOUTH AFRICA (1970 – 2000)

South Africa entered the game meat export market in early 1970 with game meat exports to Germany and later to other European countries. In 1991, with the falling of the Iron Curtain that had divided the two Germanys, the export trade suffered a serious blow in that roe deer from the Eastern Bloc countries became readily available, whereas South African products became too expensive for that market. This forced the industry to develop an internal game marketing strategy, which consisted mainly of consumptive and non-consumptive methods. Eco-tourism was, and still is, classified as a non-consumptive utilisation method, which means that the game is not removed from the wild. However, this method did not provide a solution to the problem of oversupply of game (Erasmus, 2000). Non-consumptive utilisation methods include activities such as game sighting, farm holidays, hiking, photography, hunting schools and seminars, whilst consumptive utilisation methods are where the products derived from game are marketed for utilisation by consumers. This involves activities such as trophy hunting, the production of biltong, live sales, game meat sales, taxidermy and bow hunting (Jansen van Rensburg, 1992). Historically, however, each of the utilisation methods has had its limitations (Eloff, 2002).

Similar to the present day, game farmers' positions regarding the marketing of their products differed from that of other farming activities up until 2000, as the marketing of their products was more complicated. In the case of trophy hunting, for example, a relatively small percentage of animals are of trophy quality, and biltong harvesting is limited to winter months (Carter, 2010). In 1991 there was a downturn in the number of international hunters visiting South Africa, which correlated with the abundance of game that became available in the Eastern Bloc countries at that time. Local hunters also resisted for various reasons, such as the exploitation of hunters by farmers as well

as local conflict in South Africa (Erasmus, 2000). The local downturn could also be attributed to the negative image created by the media regarding the high prices charged for game. Erasmus (2000) further postulated that the economic downturn in game farming could have been aggravated by pressure placed on the industry by environmental organisations or when government institutions with available land, such as the South African Defence Force and certain educational institutions, initiated game farming on land purchased with taxpayers' money. This forced game farmers to expand their marketing strategies. A holistic approach was needed in order for farmers to earn interest on their capital investment in game farming. Despite this, however, more farmers turned to game farming and the supply soon exceeded the demand. According to Human (1991), the oversupply of wild game could also be attributed to the economic situation in South Africa. Factors such as high inflation, high interest rates and unemployment in the country, which influenced the purchasing power of consumers, caused them to classify meat as a luxury item and instead opt for cheaper cuts of meat. Another factor that contributed to the oversupply of game was excessive meat imports after South Africa had become an alleged dumping ground for red meat due to insufficient safeguards against this (Greyling, 2000; Van Zyl, 1998).

Despite the many problems faced by the game industry, Eloff (2002) argued that the industry thrived and in 2002 could be regarded as the agricultural industry that had shown the fastest growth over the preceding forty years. The profits made by the industry in 2000 are set out in Table 1.1. The data, excluding related industries that were dependent on the game industry at the time, showed an annual turnover in excess of R800 million in 2002 (Eloff, 2002). Notwithstanding the resources of the game industry, Erasmus (2000) pointed out that there were 5 061 fenced game farms covering an area of 10 364 154 hectares in South Africa in 2000 and warned that if these farms were not carefully managed, it could contribute to an oversupply of game. The rapid growth in the game industry had a downside in that the market for live game, especially for the more general game species, was reaching saturation point (Erasmus, 2000).

Table 1.1 Profits made by the South African game industry through various utilisation methods (Eloff, 2002)

Utilisation activity	Gross profit in South African Rand
Biltong hunting	450 000 000
Trophy hunting	153 000 000
Live game sales	180 000 000
Eco-tourism	40 000 000
Game meat sales	20 000 000
TOTAL	843 000 000

Another factor impacting on the game industry was the fact that foreign hunters were often scared off by the crime rates in the country. According to Viljoen and Van der Merwe (2000), between 1992 and 2000 an estimated 4 730 attacks occurred on farms in which 820 farmers were murdered. Despite this, however, the number of game farmers increased steadily and increasing numbers of stock farmers in South Africa changed over to game farming. Apart from the prevailing economic downturn at the time due to the poor yield generated by stock farming, this was also the result of the import of cheaper beef, mutton and poultry, increasing stock theft, labour laws and ever increasing input costs (Erasmus, 2000). The above points clearly indicate that the South African game industry needed alternative marketing channels to address the problem of oversupply. In seeking solutions, cognisance should be taken of the ecology, the game farmer and the game industry as a whole. Furthermore, Jansen van Rensburg (1992) expressed the opinion that the problem can only be addressed through the extensive marketing of game meat.

The game meat industry also faced some unique challenges in that there were more role players in the supply chain than in the local red meat industry, as there were primary producers, professional game harvesters, wild game meat abattoirs and the retailers, which all contributed to high production costs. The fact that fresh wild game meat is highly seasonal and that the cost of fencing for farmers who wish to harvest throughout the year is very high, also contributed to the high price of the final product presented to consumers (Eloff, 2002).

Historically, the most common game species ranched in South Africa has been springbuck, eland, blesbuck, impala and (kudu) (Conroy & Gaigher, 1982). Jansen van Rensburg (1992) found that South African game farmers ranked springbuck as the most favoured species to farm, followed by impala, kudu and blesbuck, making them the species most commonly cropped, as depicted in Figure 1. By 1992, springbuck constituted nearly 60% of all species cropped in South Africa (Figure 1). According to

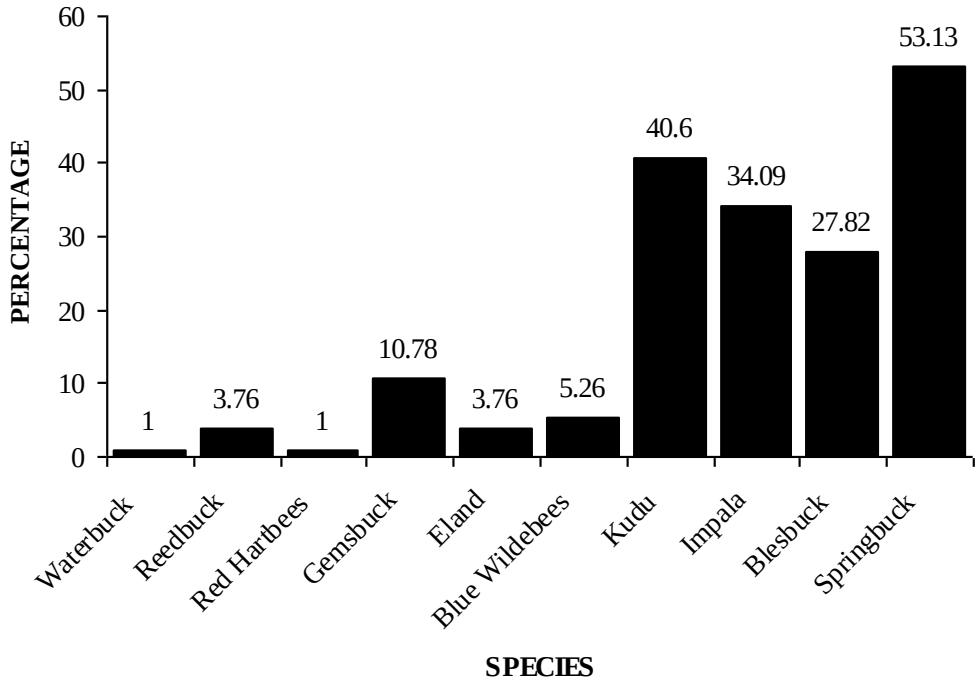

Figure 1.1 Game species as a percentage of most favoured species cropped in South Africa (Jansen van Rensburg, 1992).

Springbuck has a carcass yield of 58% as reported by Conroy and Gaigher (1982) which contributes to the popularity of this species. Lambing of this species could take place twice a year in years of adequate rainfall and the normal cropping rate of 30% could be increased to 40%. An increase in the cropping rate of young lambs could also stimulate reproduction by inducing ewes that would otherwise have lactated, to further reproduction (Skinner and Louw, 1996).

Current game industry: Currently (2010/2011), the South African game industry is based on a free market system, and the economic value of the industry should not be underestimated. The industry annually contributes in excess of R7 billion to the South African economy, this despite lingering challenges that place limitations on the growth and development of the industry (Botha, 2010b). At present, the main challenge facing the industry is to find measures to sustain the economic growth of past years, despite the increasing financial, socio-economic and political pressures currently being experienced (Carter, 2010; De Villiers, 2010). The recent international financial and credit crisis caused a estimated 25% reduction in the number of overseas hunters visiting South Africa in 2009. In 2010, the FIFA Soccer World Cup event that was held in South Africa caused a further estimated reduction of 30% for the duration of the event due to elevated air ticket prices (Botha, 2010b), although it is hoped that the hunters will have returned by 2012. These factors also had an influence on related industries such as the hunting gear, taxidermy and game-catching industries. Eco-tourism also suffered and farmers have to contend with excess game on their land. Although local hunters could present a solution, game has to be traded at 40% less than the market price that would have been paid by international visitors, which the farmers are unwilling to accommodate. Moreover, the exchange rate poses a challenge to the industry, as farmers are keeping their game on the land in the expectation that the exchange rate will improve (Botha, 2010b; Retief, 2010).

Trophy hunting is fundamentally constrained by the size of the game population, while returns in eco-tourism are poised to become increasingly difficult in highly

competitive, capital intensive, international markets. Live game sales, on the other hand, are dependent on the consumption of the above sectors, and therefore if they are slow, ultimately sales will be slow as well. From a socio-economic perspective the industry takes up a significant amount of land (Carter, 2010) and some politicians have difficulty regarding game farming in the same category as plant and stock farming for several reasons, including the opinion that game farming takes up too much land and that it does not create adequate job opportunities (Bezuidenhout, 2010; Botha, 2010b). This leads to questions about the industry's economic development potential. If these questions are not satisfactorily answered, pressure on the game industy will increase due to the ever increasing need for sustainable food security and job opportunities for all South Africans (Carter, 2010). There is, however, one aspect of production – namely the marketing of game meat – that has not seen adequate investment and which needs to be further explored.

Game meat industry: South African game meat has the potential to distinguish itself from farmed venison in New Zealand, Australia and Europe, since game in South Africa is still untamed, roams wild on farmland, and is not exposed to dipping or growth stimulants. The meat from South African wild game may therefore be considered organic and exotic (Hoffman & Bigalke, 1999). With this knowledge, as well as the experience gained in the marketing of alternative and exotic meat types such as crocodile and ostrich, the South African meat industry has shown the ability to compete successfully in the international meat arena and should therefore be able to compete just as successfully with game meat (Hoffman, 2003). South Africa annually exports 350 tons of wild game meat, of which springbuck meat makes up the largest component. Apart from springbuck, other species such as kudu, blesbuck, gemsbuck, rooibuck en wildebeest are also exported. Internationally there has been a lower demand for South African wild game because of high volumes entering the European Union (EU), price resistance after sharp increases in previous years, and the worldwide economic crisis that has adversely affected world markets since 2008. Apart from this

the market demand is higher later in the year when the European winter sets in which is in contrast to the seasonal fresh meat harvest of winter in South Africa (Botha, 2010a).

Marketing of wild game meat: Most game production companies in South Africa are of the opinion that branding of their products is important in order to maintain corporate identity and that marketing and market development in the international arena should be expanded. Such companies sell their products to international buyers under their own brand names, although each brand has a generic specification stating that it is a naturally organic South African product. South African game is marketed under the same umbrella, with the exception of springbuck meat, which is marketed separately because of its numbers in the market and the familiarity of the name (De Villiers, 2010; Retief, 2010). Although springbuck meat is very popular in the international market, species such as zebra, kudu and blesbuck are gaining market share and, in some instances, even surpassing the demand for springbuck meat (De Villiers, 2010). If game production could increase, the ideal would be to market each species according to its own unique qualities, seeing as there are major differences in species regarding size, cuts, texture and taste (Retief, 2010).

Quality and price: Farmed game from New Zealand, which is directly slaughtered in abattoirs like cattle, naturally has lower bacterial counts and therefore a longer shelf life than South African game meat which is harvested in the veld and then transported to an export slaughter facility to be processed. The New Zealand product is therefore also typically more expensive than that of its competitors, with specific cuts that are constant in size and texture and which always have a similar appearance and taste (Botha, 2010a). The South African product compares well with the European product, which is harvested under similar conditions. In order to keep its market share, it is therefore imperative that the South African product be produced under the utmost hygienic conditions.

NUTRITIONAL, SENSORIAL AND CONSUMER ASPECTS RELATING TO GAME MEAT

Sensory characteristics: Consumer perspectives regarding game meat are difficult to fathom, as individuals have different perspectives in terms of sensory, nutritional, environmental and economic factors, as well as individual consumer perceptions. Bakula and Kedzior (2001) identified sensory characteristics as the most important quality attributes of meat and meat products. The sensory attributes of game meat, such as aroma, juiciness, tenderness, texture and overall flavour, have been comprehensively researched against the backdrop of maturation (ageing) and found to be very acceptable to consumers (Hoffman, Kroucamp and Manley, 2007; Jansen van Rensburg, 1997). The taste, texture and flavour of the various game species differ according to habitat, amongst other things. Blesbuck and impala, for example, feed predominantly on grass, whilst springbuck thrive on arid, open short grassland and Karoo veld. The wild herbs and desert grasses of the Karoo generate a completely different taste and more delicate flavour (Jansen van Rensburg, 1997). In a study on sensory meat evaluation as influenced by age, gender and production region, Hoffman *et al.* (2007) found that production region had a significant effect on the sensory attributes evaluated (aroma, initial juiciness, sustained juiciness and residual tissue ratings), whereas the effects of age and gender were found to be minor. Mostert and Hoffman (2007) found that gender had no effect on the chemical composition of kudu meat, while Radder (2003) found that production region had a significant effect – and age and gender a minor effect – on the sensory attributes evaluated. Hoffman *et al.*, (2007) found that pH and tenderness ratings were inversely correlated, indicating a decrease in the acceptance rating with an increase in pH, thus implying that with an increase in pH, the juiciness rating of the meat decreased. It was further noticed that moisture and fat content had no significant effect on the perceived sustained juiciness of the meat, while flavour intensity was not significantly influenced by age, gender or production region (Hoffman *et al.*, 2007).

Environmental concerns: In South Africa particularly, game has traditionally been admired in its natural habitat and therefore, from an ethical point of view, there is a stigma attached to consuming game meat whereas internationally, campaigns are often run against the consumption of game meat. Consumers are increasingly concerned about the environment and health-related matters. Radder (2002) described game meat as meat that is free from disease and which originates from animals in their natural habitat, without human intervention in genetic selection, the use of growth hormones, insecticides or pesticides. This was confirmed by Hoffman and Bigalke (1999) who suggested that wild game meat can be seen as an organic product.

The requirements for organic products include minimal damage to the environment, minimal use of non-renewable resources, the enhancement of biological cycles involving micro-organisms, the prohibition of agro-chemical pesticides, careful attention to the impact of farming activities on the environment, and the conservation of wildlife and natural habitats. Traceability from farm to fork therefore plays an important part in addressing consumer concerns in this regard and serves as a prerequisite in the production of all food, especially to address international concerns (Lampkin & Padel, 1994). Product traceability comprises the following two components: A unique identification system, and a credible and verifiable mechanism for identity preservation. Traceability systems can be subdivided into four categories: 1) Country of origin; 2) Retail; 3) Processor; and 4) Farm to retail identity (McKean, 2002). Traceability is the solution to consumers' demand of transparency and is synonymous with safe and high-quality food (Dalvit, De Marchi & Cassandro, 2007). It therefore forms one of the cornerstones in proving credibility that not only addresses environmental concerns, but also provides security regarding consumer health and wellbeing.

Health and nutrition: Today's consumer regards health as a macro concept and prefers to live a balanced lifestyle (Armitstead, 1998). Although the nutritional characteristics of food are important, this aspect cannot be addressed in isolation and must be

approached holistically. Whist environmental contaminants directly influence the safety of food; nutrients are needed for a healthy lifestyle. Hoffman and Wiklund (2006) described various factors that influence the perceptions of modern consumers. These include the production system used; the extensive keeping of game in Africa that can be regarded as organically raised game; the ethical cropping of game in free-range game production systems found in Africa where professional sharpshooters are used to kill game. The preferred method would result in minimum stress caused to the remaining animals, which in turn has a direct influence on the quality and therefore inherent healthiness of the meat. Radder and Le Roux (2005) concluded that wild game meat (venison) offers particular health benefits to South African red meat lovers. Red meat (primarily beef, mutton and lamb) is seen as a major source of fat in the diet – especially saturated fatty acids, which have been implicated in diseases such as various cancers and especially coronary heart disease associated with modern lifestyles. It is, however, the fatty acid composition of meat, particularly the ratio of polyunsaturated fatty acids (PUFAs) to saturated acids, which is of greater importance (Hoffman & Wiklund, 2006). Venison has a high ratio of polyunsaturated to saturated fatty acids – about twice that of beef and lamb (Elliot, 1993). According to Hoffman and Wiklund (2006) and Wood, Richardson, Nute, Fisher, Campo, Kasapidou, Sheard and Enser (2003), the United Kingdom's Department of Health recommended in 1994 that the ratio of PUFAs to saturated fats should be above 0.4. Since some meats naturally have a ratio of around 0.1, meat has been implicated as a main source of imbalanced fatty acid intake by present-day consumers. The type of PUFAs and the balance in the diet between omega-3 PUFAs, formed from x-linoleic acid (C18:3) and omega-6 (n-6) PUFAs formed from linoleic acid (C18:2) is regarded by nutritionists as a primary risk factor in cancers and coronary heart disease, especially with regard to the formation of blood clots leading to heart attack. The increasing awareness of the need for diets to contain higher levels of n-3 PUFAs has focused on the importance of meat as a natural source of these to the diet. It is thus imperative to be aware of the fatty acid composition of meat from different species in order to make an informed decision regarding the best protein source (Hoffman & Wiklund, 2006). For this reason the

nutritional attributes of wild game meat have been researched extensively over the past few years. Huntley (1971) noted the extremely low fat percentage of wild ungulates when compared to cattle. Springbuck meat contains lower levels of saturated fatty acids, with high levels of PUFAs and serum-cholesterol lowering characteristics (Viljoen, 1999).

Consumer perceptions: In a study on factors affecting food choice in relation to venison (wild game meat) in South Africa, Radder and Le Roux (2005) concluded that accurate information communicated to consumers would assist them in making informed choices. The authors highlighted the complexity of food choices by taking into account sensory appeal, familiarity and habit, social interactions, monetary cost, availability, psychographics and various market-related factors such as distribution and promotion. Dransfield, Zamora and Bayle (1998) postulated that the perceptions regarding meat and other food depend not only on their inherent properties, but also on the way in which they are interpreted with regard to immediate external factors and the previous experiences of the consumer. If consumers have already experienced game meat of inferior quality, it is unlikely that they will purchase this type of meat again.

There is currently no known organisation that controls the quality of local game meat production and therefore there are no quality standards or standardised cuts for game meat. There are also no existing standards for game meat production or processed products, thus creating endless possibilities for game ranchers and game meat producers. This, however, leads to a lack of control over the quality of the meat that is sold to the consumer (Eloff, 2002). This was confirmed by De Villiers (2010), who stated that the sale of inferior quality meat originating as a by-product from other sectors of the hunting industry negatively influences the sensory quality of the meat and therefore impacts on the efforts by the game meat industry to develop their specific quality products, especially in the South African market. Game meat of varying quality is therefore sold, creating consumer distrust and confusion and having a detrimental impact on game meat sales. Legislation governing game meat in South Africa is

inadequate. The Meat Safety Act mentions the various game species covered by the act, however game meat regulations providing specific guidelines on the practical implementation of the act are still in a draft format and have not been promulgated. If promulgated, problems might arise with implementation as the authorities do not have the human resource capacity to address the additional workload that would be created in governing the harvesting and processing of wild game meat. The introduction of a Game Scheme that will be promulgated under the Meat Safety Act (Act 40 of 2000), which is currently at an advanced stage of development, should alleviate this problem by providing for certain exemptions in the case of limited wild game slaughtering (RSA, 2010). In a study on consumer expectations, perceptions and purchasing of South African game meat, Crafford, Hoffman, Muller and Schutte (2003) found that South African consumers were ill-informed regarding the positive attributes of wild game meat and that they were ignorant about its health benefits. However, the mentioned study found that consumers did consider fat content the most important quality when purchasing meat. Consumers indicated that wild game meat was not readily available and that they were not willing to pay more for game meat than for other types of meat. Radder (2003) concluded that despite all the sensory and nutritional advantages of the product, decisions that drive choices and actions regarding the acceptability of the product were driven by the emotions and motives of individual consumers. The fact that South African wild game meat is marketed as a naturally organic South African product definitely encourages consumers to purchase the product (De Villiers, 2010). Tourists, local chefs, and increasingly the general consumer involved in tourism, welcome wild game meat as a flavourful and nutritional alternative to lamb and beef (Crafford *et al.*, 2003).

RATIONALE OF THE STUDY

The study was prompted by the fact that the Free State Province is the third largest producer of game in South Africa. Most of the game is produced in the Xhariep District to the south of the province, which is one of the poorest districts in the

province. Ironically, the true wealth associated with wild game meat is being generated by the provinces that export it. The fact that producers of game in the Free State are being paid local prices for their game, whilst foreign currency is being generated by the provinces in which the game is slaughtered and processed before being marketed abroad, is one of the major reasons for the loss of revenue. Therefore, by optimising resources within the province, employment opportunities can be created and wealth can be generated (both directly and indirectly), which should benefit the citizens of the Xhariep District, as well as the entire Free State Province.

The Free State Province owns one national park and six nature reserves on which game is kept and these are managed by the Department of Environmental Affairs. In addition, there are several privately owned game reserves in the province, as well as a number of game farms. Many of the commercial stock farmers in the province also have camps in which game is kept. In recent years it has become clear that for various reasons, although mainly due to stock theft, several farmers have converted from farming with small stock to game. A survey conducted in 1985 showed that the majority of game could be found in the southern and south-western parts of the province (Terblanche, 1991). Game-export abattoirs and processing facilities are situated in the Northern and Eastern Cape provinces, which means that there is not only an outflow of game carcasses for export purposes from the Free State Province, but also a loss of employment opportunities and a loss of opportunities for the generation of valuable foreign currency. There are 21 high-throughput red meat abattoirs in the province, the majority of which are underutilised, posing the question as to whether these abattoirs could be used for the slaughtering of game. However, if these abattoirs are not yet suitable for the slaughtering of game, we must ask what requirements they must meet in order to become suitable. If such abattoirs were to be adapted to the slaughtering of game, then further questions arise in respect of the requirements to meet the EU standards for the exporting of game meat and, more importantly, whether these requirements can be met.

1.2 AIMS OF THE STUDY

The main aim of the study was to compile guidelines for the wild game meat industry that would indicate the requirements for the production of wild game meat for the international market. A further aim was to determine the requirements for adapting high-throughput red meat abattoirs in the province to enable the slaughtering and processing of game meat for both the local and export markets. This study also aimed to investigate the feasibility of establishing an EU-approved export abattoir in the Free State Province.

The objectives of the study were:

- To review the processing and export requirements for wild game meat in South Africa through a literature study of all EU legislation, directives and other relevant literature on the subject;

- To assess wild game production and utilisation in the Xhariep District of the Free State Province with regard to game numbers and species, how they are utilised, whether the game is organically produced, the size of land on which wild game is kept, and the carrying capacity of the land;

- To investigate the utilisation of existing slaughter facilities as potential wild game meat export facilities; and

- To develop a novel assessment matrix for the measurement of the level of compliance of existing abattoirs and their potential to be developed into EU export facilities.

The study ultimately endeavours to contribute to the prosperity of the Xhariep District and the Free State Province of South Africa, by presenting novel solutions for the optimal utilisation of one of its key resources, namely game meat.

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Chapter 2

PROCESSING AND EXPORT REQUIREMENTS FOR WILD GAME MEAT IN SOUTH AFRICA: A REVIEW

This chapter has been submitted, partially or in full, for publication in Food Reviews International; ISSN 8755-9129.

ABSTRACT

The requirements for the harvesting of South African wild game and for the processing thereof into wild game meat products for export purposes are reviewed in this chapter. Various role players have to work in harmony to successfully trade in wild game meat internationally. These include the government in terms of trade treaties, as well as veterinary services in terms of giving assurances to the World Organisation for Animal Health (OIE) regarding the occurrence of transmissible diseases and details regarding the country's ability to apply control measures to prevent certain listed diseases. Other assurances include adequate staff for surveillance, biological testing, the monitoring of vaccines, as well as veterinary certification of products and verification of the integrity and impartiality of officials. Veterinary Services, as the controlling authority, are responsible for the monitoring of compliance with local legislation and international import requirements by exercising control over game farmers, facilitating the registration of farms, monitoring hunters/harvesters and their equipment, vehicles, depots, hygiene management and operating procedures, as well as certifying export products. The study continues by reviewing the responsibilities of the farmers and hunters/harvesters of wild game wishing to harvest for the export market. The official state veterinarian at the establishment must ensure that he/she is in possession of the original documents that accompanied the truck prior to offloading. Such documents must include the health attestation, the certificate of origin, the checklist for harvesting inspection completed by the game meat inspector, and a thermograph printout. Other responsibilities before the final processing of the product can commence include primary meat inspection and control over the establishment of an export facility. In establishing an export facility, apart from the initial design, it is important to investigate a suitable location, as the importance of correct placement cannot be overemphasised as a contributing factor to the feasibility of financial survival in difficult times, when the economy is down or one of the many challenges facing the industry takes a turn for the worse. The review of the responsibilities of all role players in the industry has shown that although the business operators are responsible for ensuring compliance, the controlling authority has a major role to play in ensuring that

the owners do indeed comply with the requirements set and that all systems are put in place to honour international trade agreements. This includes audits of good hygiene practices, as well as hazard analysis and critical control point (HACCP) procedures. The controlling authority can guide the implementation of hygiene rules by the setting of objectives such as pathogen-reduction targets or performance standards and the monitoring of traceability systems of food and food ingredients as essential elements in ensuring food safety. The final demonstration of control by the exporting country is certification by the official veterinarian stationed at the plant. By signing export certificates, the veterinarian assures the importing country that the wild game meat was harvested on a registered farm and that the product, as demonstrated through official controls, is free from disease as specified in the model export certificates and as certified by the state veterinarian who issued the health attestation. He/she also certifies that the meat products being exported are free from chemical residues, that they are traceable via farm registration, and that the harvesting practices were controlled as far as hygiene procedures and animal welfare are concerned. Traceability from the farm of harvest must be demonstrated right up to the batches being exported. This information can be derived from the tamper-proof labelling on the products being exported. Effective recall procedures must be in place to ensure that products that fail to meet the specifications can be effectively traced and prevented from being exported. This review reiterates the considerable responsibility that lies with the exporting country through its Veterinary Services to ensure that there is effective control over the disease status of export products. To this end, various structures and control measures have been put in place to effectively control animal diseases and to give assurances regarding the safety of animal products to the international community. The wild game industry has managed to convince the European Union (EU), through discipline within the industry and stringent control measures that demonstrate transparency, that the industry possesses the ability to meet the demands of international trade requirements.

2.1 INTRODUCTION

In recent years, the game industry has developed into a major sector of the South African economy. In the year 2000 there were already 5 061 fenced game farms in South Africa, covering an area of 10 364 154 hectares (Erasmus, 2000). The number of game farmers has increased dramatically and more and more stock farmers in South Africa are changing over to game farming. However, the rapid growth in the game industry has created the problem that the market for live game, especially for the more general game species, is reaching saturation point (Erasmus, 2000). According to Eloff (2002), the game industry may be regarded as the agricultural industry that has shown the fastest growth over the past 40 years, with annual profits in excess of R800 million. This excludes peripheral industries that are dependent on the game industry (Eloff, 2002). The industry has shown significant growth, and Botha (2010) reported that it now has an annual turnover of up to R7 billion without any governmental assistance. The game industry has five target markets that are used in order to contain numbers: local biltong hunters, overseas hunters, eco-tourism, live game sales, and venison (wild game meat) sales. Many historical problems associated with wild game farming and marketing, such as oversupply due to eco-tourism, the perceived high crime rate that scares off foreign hunters, farm attacks and extensive and cheaper meat imports, have highlighted the need for novel and creative marketing channels to address the problem of oversupply (Carter, 2010; Van Rensburg, 1992).

The trade in meat and meat products encompasses more than simply international trade in a commodity, but also holds other advantages such as assisting in the control of game numbers, ensuring the inflow of foreign currency, and contributing to job creation. The purpose of this paper is to review the complexities of South African game harvesting for export to the European Union (EU) and the importance of all role players adhering to the requirements. In addition, this review attempts to highlight the danger of ignorance amongst role players and the possible far-reaching implications that may need to be addressed so as not to jeopardise the country's ability to export

game meat products to the EU. Finally, the review attempts to provide a unique source document for prospective entrepreneurs and developers of game meat export facilities in terms of the legal requirements for compliance.

2.2 GOVERNANCE, GUIDELINES AND LEGISLATION

***Obligations and ethics in international trade*:** For countries to trade in animal products, they must comply with the standards and guidelines as set by the World Organisation of Animal Health (OIE), which is an intergovernmental organisation responsible for improving animal health worldwide. OIE is recognised as a reference organisation by the World Trade Organisation (WTO) and, as from January 2008, has a total of 172 member countries and territories, including South Africa (OIE, 2010a). In order to reduce the risks to human and animal health in the countries concerned, veterinary administrations may base their import requirements on the OIE standards, guidelines and recommendations. To this effect, model export certificates have been developed to which specific requirements can be added (OIE, 2010b). As the import of animal products involves a degree of risk to the animal health status of an importing country, the latter must be satisfied that their animal health status is appropriately protected before trade in animals and animal products can take place. Countries must also make sure that their risk management measures rely in part on judgments made about the animal health and production systems in the exporting country and the effectiveness of the animal health sanitary procedures followed there. In order to facilitate this, the WTO has developed and facilitated a Sanitary and Phytosanitary (SPS) Agreement (OIE, 2010c).

Responsibilities of veterinary authorities of exporting countries: An exporting country should be prepared to supply the importing country with information on their animal health status and national animal health information systems to enable the importing country to determine whether the exporting country is free – or has zones that are free – of certain diseases. The exporting country must supply the OIE with

regular and prompt information on the occurrence of transmissible diseases and details of the country's ability to apply measures to control and prevent these listed diseases. Technical information, particularly on biological tests and vaccines applied in all or part of the country's national territory, must also be supplied to the OIE's Veterinary Service component (OIE, 2010d). The head of veterinary services in the exporting country is ultimately accountable for veterinary certification used in international trade. Veterinary administrations of exporting countries should have official procedures for the authorisation of certifying veterinarians, defining their functions and duties, as well as conditions covering possible suspension and termination of their appointment. They must also ensure that the relevant instructions and training are provided and activities monitored in order to verify integrity and impartiality. International trade involves a continuing ethical responsibility and this is within the recognised incubation periods of the various diseases subsequent to an export taking place. Should the veterinary authority become aware of the occurrence or reoccurrence of a disease that has been specifically included in the international veterinary certificate, this authority is obligated to notify the importing country so that the imported commodities may be inspected or tested and appropriate action be taken to limit the spread of the disease should it have been inadvertently introduced (OIE, 2010e).

Specific requirements for South Africa to export game meat to the European Union:
Apart from general ethics as required by the OIE, South African Veterinary Services are required to supply the EU with specific documented proof that the country is in control of all aspects of veterinary services that can pose a risk of spreading of animal diseases to the EU. The EU requirements are set out in regulations issued by the European Parliament and the Council of the European Union from time to time. In order to ensure the safety of food, it is necessary to consider all aspects of the food production chain as a continuum – from primary production and the production of animal feed, up to the sale of food to the consumer – because each element may have a potential impact on food safety (EC, 2002). Consequently, there is much emphasis on the traceability of food-producing animals, animal feed and any other substances

expected to be incorporated into a food product so as to establish traceability at all stages of production, processing and distribution and thus reduce food-related risks (EC, 2002). One of the major challenges facing the wild game meat trade is the traceability of the products. As these are wild animals that sometimes roam several farmlands, they are difficult to trace, as they cannot be tagged or branded in order to be traced to a specific farm of origin. In order to trade with the EU, several assurances must be given by the controlling authority, and to be in a position to provide these assurances, adequate control must be exercised over the industry. The various role players in this process are the controlling authority, the hunters or harvesters, the game farmers, and the South African game industry.

2.3 ASPECTS IMPACTING ON HARVESTING

Responsibility of game farmers: A farmer interested in cropping for export purposes is required to register his/her farm with the Provincial State Veterinarian (PSV) in the district in which the farm is located. For the farm to qualify for registration, the farmer is expected to apply the following good agricultural practices: Observe the withdrawal periods of any therapeutic remedies used on the farm; be informed about each product; not stock or use or possess any production enhancers or growth stimulants on the premises; use only feed-licks that are free of growth promoters; maintain a register of all treatments, drugs and drug therapies applied; commit to notifying the PSV promptly of any disease outbreak amongst domestic or game animals; report to a veterinarian every animal death that cannot be ascribed to an obvious cause, or which may indicate the presence of an infectious disease, so that a post-mortem examination may be carried out on the carcass; allow the PSV to inspect the animals on the farm and take samples if necessary; keep records of stock and game harvesting on the farm for at least two years; have a detailed drawing, sketch, plan or aerial photograph of the farm, indicating all structures, camps, pens, restraining and handling facilities and fences, which must be available on site for inspection purposes; negotiate with a hunting team regarding the provision of facilities, labour, electricity and water for harvesting purposes; notify the

PSV of any chemical residue risk that may arise due to the treatment of domestic animals, game animals, crops and pastures etc.; and notify the PSV of the introduction of new game onto the farm, as well as any sources of environmental contamination (RSA, 2010a).

Responsibility of the controlling authority (farm registration): In order to register a farm for the harvesting of wild game in South Africa, the controlling authority must make sure that the farm is located in the Foot-and-Mouth-Disease-Free Zone, as recognised by the OIE, or as specified in the EU directives in the case of EU exports. Furthermore, the farm must be located more than 20 kilometres from the borders of a third country that is not authorised to export wild game to the EU, although this is not applicable to the harvesting of solipeds (RSA, 2010a). Wild game may not be harvested in an area where restrictions have been instituted during the past 60 days due to an outbreak of a disease to which game animals are susceptible. The PSV must verify that the farm, animals and farming practices meet the set standards and, if the required management systems are found to be in place, the PSV will then approve the farm for export. Upon approval, the PSV will allocate a registration number to the farm, which for traceability purposes must be a lifelong number. A file with the official inspection report, the geographic co-ordinates, a copy of the registration certificate and all other relevant documents must be kept for each farm. To this effect, the South African Ostrich Business Chamber (SAOBC) has been appointed by the Department of Agriculture, Forestry and Fisheries to assist in maintaining a national database for game exports. The details of all farm registrations must be supplied to the SAOBC on a quarterly basis by the Provincial Controlling Authority (PCA), and acquired information must be used by the PSV to issue a health attestation that must accompany partially dressed game carcasses from the farm to the export facility (RSA, 2010a). Any farm that no longer complies with the requirements for export registration farm must be deregistered. At least one inspection report per farm per annum must be available and, to ensure that the country retains its export status, the PSV must promote

the notification of suspected and actual outbreaks of notifiable diseases by colleagues in private practice and amongst abattoir owners in general.

Responsibility of hunters/harvesters: A person wishing to register as a hunter for harvesting wild game animals with the intent to export must operate in co-operation with one of the export companies in the game industry. Hunters must register with their PCA, but will not be restricted to the province in which they registered. Although hunters register individually, they normally operate in teams consisting of several hunters, a registered game-meat inspector, and slaughter assistants. In order to register, a hunter must be in possession of a valid hunter's licence issued by the Department of Environmental Affairs, a medical health certificate declaring the hunter and all assistants fit to handle food, as well as the identification documents and personal details of all involved. This documentation, as well as the registration certificate bearing the hunter's registration number, must be carried by the hunter at all times and be produced for inspection at each harvest (RSA, 2010a).

Prior to harvesting: The hunter must ensure that the farm on which the harvesting is to take place is registered as an approved farm for the export of wild game, and must be in possession of a health attestation regarding the health status of the animals to be harvested, as issued by the PSV in the area in which the harvest is to take place. The hunter must ensure that chilling vehicles for harvested carcasses, as well as harvesting vehicles and transferable or permanent depots are available on a set date at a particular time for harvesting to commence (RSA, 2010b). The team leader must provide the PSV with a harvesting programme at least five working days prior to a hunt. In provinces where only official meat inspection is allowed, the provincial game co-ordinator must be notified at least two weeks prior to harvesting. All meat inspection personnel must be registered in the province in which the harvest is envisaged. Should a planned harvest be cancelled, the PSV must be notified at least 12 hours prior to the harvest. The hunting team leaders must avail themselves of their team members' hunting skills, slaughter techniques and procedures. Hygiene management systems as prescribed by the Meat Safety Act, Act 40 of 2000 (RSA, 2000) must be in place for

harvesting procedures, and proper records must be kept. It is the responsibility of the team leader to ensure that there is an adequate supply of potable water, as well as toilet facilities, toilet paper, sterilisers, chemicals, disinfectant soap, disposable towels and clean protective clothing for each day of the harvest, plus receptacles for condemned material available at the point of harvest. They must also see to it that the animals are harvested in accordance with other relevant legislation to ensure the welfare of animals (certain animals may only be harvested during the daytime, for example) and the conservation of nature. Hunters must ensure that they have all their personal documentation available for auditing purposes, as well as the documentation that is required during the harvest and which must accompany the partially dressed game carcasses to the game-processing facility (RSA, 2010b).

Requirements for the vehicles used to transport harvested game: Vehicles transporting carcasses from the point of kill to a game depot (cropping trucks) must be constructed according to the category of game handled. Vehicles used for the harvesting of small wild game (Category C) are required to have a hanging frame that is corrosion resistant and free from holes and cracks so as to bleed carcasses in a hanging position. Such vehicles must be durable and non-toxic, have smooth surfaces, and be impervious, easily cleanable and resistant to impact. The vehicle must be equipped with facilities for the cleaning and sterilising of bleeding knives with water and a chemical sterilisation agent that has been approved as a food-grade chemical by the South African Bureau of Standards (SABS). A hand-washing facility, with potable running water and soap, must be available for the workers responsible for bleeding and eviscerating the harvested game. No loose objects other than the ones mentioned may be kept on the vehicle, while artificial light with a minimum light intensity of 220 lux must be provided where game is bled at night. In the case of larger wild game (Category B), a hoist that can be positioned at 20° to 30° for the hanging and bleeding of animals must be supplied. In the case of vehicles used for harvesting large game (Category A), the PCA must be provided with a protocol regarding the method of killing and the handling procedures for each species. Vehicles transporting partially dressed game carcasses and red offal must comply with regulations pertaining to the

transport of meat (RSA, 2004). Continuous thermo-control recording must take place from loading to the point of arrival and unloading at the game export establishment. The recording must provide for accurate actual time/temperature analysis, covering all phases of cropping and transport (RSA, 2010b).

Transferable depots, facilities and equipment: The transferable depot must be constructed according to the category of game handled. The hanging frame must be high enough to prevent the head or neck of the carcass from coming into contact with the ground, while a system must be in place to address the accumulation of blood and waste products on the ground below the frame. A separate approved facility must be provided for the inspection of the rough offal, and adequate hooks must be provided for the inspection of heads and feet if removed, as well as for red offal. In the case of Category B animals, plucks must be hung separately for inspection purposes, while in the case of Category C animals the plucks may be left hanging partly eviscerated attached to the neck area for inspection, provided that there is no contact with the ground. Sufficient closable containers must be provided to accommodate red offal, rough inedible offal and condemned material. Potable water for the washing of hands and equipment at 40°C with disinfectant soap, as well as hand-drying facilities (disposable towels) and facilities for the sterilisation of knives and equipment at 82°C or by chemical sterilisation methods (with an SABS-approved food-grade chemical) must be provided. When such activities take place at night, artificial light with a minimum intensity of 220 lux for dressing and 540 lux at the inspection point must be provided (RSA, 2010b).

Hygiene management system: All harvesting teams are required to have a documented hygiene management system in place, which stipulates the procedures to be followed. A hygiene management programme for ante-mortem inspection must be in place and must include control measures for training hunters to identify animals with obvious abnormalities, noticeable clinical signs of disease and/or visible pathological conditions, so as to exclude such animals from the harvest. The hygiene management programme for slaughter and dressing should include control measures to ensure that no contamination of meat and edible products takes place and that workers are trained

in the correct slaughter techniques. A management programme for personal hygiene, which includes a general code of conduct and a training programme with records of surveillance and supervision, must be available. Other programmes should address the medical fitness of workers, the temperature of water sterilisation systems and the maintenance of chemical sterilisation systems, with the hygiene management programme to be adapted accordingly. Programmes to ensure the availability of liquid soap, soap dispensers, toilet paper and disposable towels must be implemented. The importance of sanitation and continuous cleaning, the availability and safety of water, the implementation of waste-disposal systems, and the importance of constant temperature control in the chiller vehicle are other important facets of such programmes. The issue of constant temperature control also applies to the animal carcass, which should have a deep-bone temperature of less than 7^{o}C within 24 hours after harvesting (RSA, 2010b). To ensure compliance, standard operating procedures must be followed, including: (a) The method of shooting the animal must comply with animal welfare codes and must result in immediate death. For export purposes, only a headshot is acceptable and an animal killed with a thoracic shot is subject to veterinary approval. The carcass of an animal killed with an abdominal shot must be condemned and may not be transported together with approved carcasses to an export establishment. (b) Bleeding must take place within 10 minutes of the animal being shot and is performed by severing the jugular vein and carotid artery on either side of the neck. The bleeding knife used must be cleaned and sterilised by means of a chemical sterilisation method using a SABS-approved food-grade chemical. A two-knife system must be used to ensure the effective sterilisation of the knife not in use, or alternatively a multi-knife system can be used, whereby the knives are sterilised upon their return to the depot. (c) Transport of harvested game from the harvesting area in the field to the game depot or game abattoir must take place within two hours after being bled. If bloating occurs, the carcass must be eviscerated as an emergency in the field or be brought to the depot within 30 minutes after being bled. Care must be taken not to contaminate the neck-slit area when transporting the carcass to the game depot or abattoir. (d) The season during which harvesting takes place must be considered, as the

time between evisceration and chilling should not exceed four hours. During summer months, special attention must be given to the prompt refrigeration of the game carcasses after evisceration, while no harvesting may take place during rainfall. (e) Effective insect control must be exercised. In the event of excessive flies, blowflies or other flying insects being attracted to the evisceration area, which can cause contamination of the product, cropping must be discontinued (RSA, 2010b).

Game depot procedures: At the game depot, a time separation between "clean" and "dirty" functions and workers is required. Each function in an export facility is categorised and can be separated by distance and/or physical barriers. The activities include: (a) Removal of heads and feet, which can be regarded as a "dirty" function. Heads and feet may be removed at the game depot if required, provided that a comprehensive post-mortem meat inspection is done. If the heads and feet are to be sold as edible rough offal, they must be stored in containers away from the floor. Horns may be removed with part of the cranium attached and be stored separately. (b) Evisceration at the game-harvesting depot must take place within two hours of bleeding, provided that if the danger of bloating exists, evisceration may take place in the field. Carcasses must be transferred from the collecting vehicle to a clean slaughter frame, taking care to avoid contamination or soiling. The opening of incision lines on the hide or skin must be done with a clean, sterile knife from the inside to the outside only (spear cuts). Lactating udders must be removed with the skin on, leaving the *Lnn inguinalis superficialis* on either side intact, since lactating udders are regarded as condemned material. During the evisceration of a carcass, the exposed meat must not be allowed to come into contact with platforms, slaughter frames, the ground or floor, the outer surface of the skin or hide, or any soiled equipment. No partially dressed carcass may be washed, while any parts of the carcass that have been accidentally soiled or contaminated must be cut off. During evisceration, it must be ensured that both the carcass and its corresponding organs are identifiable for meat-inspection purposes. Where official meat inspection is done at the depot in the field, the red offal may be harvested (on condition that there is separation and removal of the oesophagus) and transported in separate containers to be sold as edible offal. (c) A field/official

game meat inspector/examiner must be included in every harvesting team. The EU requires every harvester – or one of the team members – to have sufficient knowledge of the pathology, production and handling of wild game and wild game meat to perform an initial examination of wild game on the spot directly after harvesting (EC, 2004a). Therefore, the South African controlling authority allows harvesters in possession of a field meat examiner's qualification to perform game meat inspection in the field, although official meat inspection is preferred in view of enhancing control. As part of a preliminary primary meat inspection, the field game meat inspector/examiner at the depot must perform a complete inspection of the head and feet, as well as rough and red offal, and must detail any abnormalities in an inspection report to the inspector/veterinarian at the export establishment. Audits are performed to ensure that the hunters/harvesters have in fact adhered to the requirements, and these involve the completion of pre-harvest checklists and the performance of periodic checks to verify whether the hunting procedures comply with the requirements and the harvesting team's documented hygiene management systems. All chemicals used for chemical sterilisation must be approved by the controlling authority. All non-conformances and observations must be recorded and reported to the official veterinarian at the export facility by means of documentation such as the certificate of origin stating the number of animals harvested, as well as the tag numbers of carcasses and offal to ensure correlation. The meat inspector must ensure that uniquely numbered official seals are available for the sealing of chiller trucks prior to the transportation of partially dressed game carcasses to the export establishment, and seal numbers must be noted on the certificate of origin at every point of harvest. Prior to the dispatching of partially dressed wild game carcasses, the game meat inspector must again check the residue status of the particular farm for any changes in the farm's risk profile (RSA, 2010c). (d) The loading of partially dressed game carcasses and red offal (if not inspected at the depot) must take place within four hours, which can be extended to 12 hours in the case of the ambient temperature being less than 12°C. Carcasses must be hanged away from the floor and from one another in such a way as to ensure optimal airflow within the chiller space. In cases where partially dressed game carcasses and associated red offal

are held in a chiller truck, the chiller unit must have the potential to chill the carcass to a temperature of 7°C or less within 24 hours of harvesting. Thereafter, the temperature of the carcasses must be maintained between -1 and 7°C until offloading. Last-harvested carcasses can be transported together with previously chilled carcasses, provided that they have been hanged to cool and dry at an ambient temperature before loading. Carcasses must be hanged and handled in such a manner as to avoid contact between skin surfaces and exposed meat or body cavities (RSA, 2010b). Carcasses must be transported in vehicles fitted with thermo-graphic recorders in order to verify the temperature in each vehicle's loading space during transport. Vehicles must reach the final export establishment within five days from the killing of the first animals. In order to qualify for export, the relevant documentation must accompany the consignment to the export facility.

Arrival at export establishment: Prior to offloading at the export establishment, the PSV on site must ensure that he/she is in possession of the original documents that accompanied the truck. Such documents include the health attestation, the certificate of origin, the checklist for harvesting inspection completed by the game meat inspector, and a thermograph printout. The latter must state the time of loading of carcasses into the chiller vehicle, extending through the time of transfer to other chiller vehicles and concluding at the time of offloading at the establishment. In cases where the mobile chiller doing the offloading is not the chiller that transported the partially dressed game carcasses from the point of harvest to the establishment, the thermograph printout of the first mobile chiller must accompany the partially dressed carcasses to the establishment (RSA, 2007b).

2.4 EXPORT FACILITY DESIGN AND PRACTICES

Before establishing an export abattoir and deboning plant for the export of wild game, the prospective facility owner will have to become familiar with all the legislative requirements for establishing such a facility, as well as the import requirements of the importing country. In establishing such a facility, it is important to take cognisance of various essential factors, including the correct choice of premises, the correct design of the facility, the maintenance of the structures, the sourcing and training of personnel, and the development of procedures (hygiene management systems) for the operation of the facility. The owner will also be expected to negotiate with the relevant provincial authorities regarding the appointment of inspection personnel at the facility. Such personnel must be independent of the facility and therefore they must either be employed in government service or be from an independent service provider registered with the authority. An official state veterinarian must be appointed to supervise the meat inspection service and for certification purposes (RSA, 2007a).

Development requirements: When conducting a preliminary viability study, a prospective developer should take cognisance of the fact that although a facility might be beneficial to a specific community or to the country as a whole, it remains the responsibility of the owner to obtain the necessary approval for establishing a particular facility. In this regard, the following should be taken into consideration:

Premises: It is important to remember that although the EU requires government assurances as far as meat inspection is concerned, it is sometimes difficult to obtain the services of professionals such as veterinarians if the abattoir is situated in a remote area (EC, 2004a). This could have an influence on the viability of a facility and it is therefore important to ensure that a meat inspection service can be provided. It is also important to obtain prior written approval for the project from the local authority in the area in which the abattoir is to be established so as to ensure that the site has been properly zoned for abattoir use (this can be done by referring to the title deeds of the property). Other role players to be consulted are the Department of Health (in respect of possible environmental

pollution), the Department of Water Affairs (in respect of possible pollution of underground water), and the Department of Environmental Affairs. The Department of Environmental Affairs usually requires a basic assessment for abattoirs (RSA, 2010e) however, should the planned activity trigger a activity as listed in listing notice 2 (RSA, 2010f), a full environmental impact assessment (EIA) might be required. In choosing a suitable site, the environment, geological structure and features, site dimensions, availability of services and other general considerations should be taken into account.

Environmental considerations: As the prevention of contamination of the product is of the utmost importance, no possible source of contamination should exist in the vicinity of the planned facility, while the facility itself must not be a source of pollution to the environment. Meat-processing plants are classified as light industries and should therefore not be situated near residential areas, rivers or wetlands where they can cause pollution. The prevailing winds in the area must be taken into consideration so as not to position the facility downwind of any source of pollution (Van Zyl, 1995).

Geological structure and features: The drainage ability of the soil is affected by various geological factors such as the nature of the soil, the height of the water table, and the natural slope of the land. This is an important factor to consider to ensure that runoff water does not pollute the underground water and to prevent dampness within the facility.

Site dimensions: The proposed site must be large enough to allow the facility and activities to be correctly aligned and oriented regarding the separation of "clean" and "dirty" areas, prevailing winds and drainage. The possibility of future extensions must also be considered.

Services: The availability of services is an important factor to consider when making a decision on the correct locality of an establishment. A sufficient supply of potable water is an essential prerequisite, and the volume of water needed is determined by the maximum envisaged output of the facility. The water must be under pressure and must comply with the quality requirements for Class II drinking water, as set out in the South African National Standard, 241 of 2006 (SABS, 2006). Consideration should be given to the storage and treatment of water should it be necessary. A sustainable electricity supply or other reliable source of power for heating water, running the chiller units and

providing for the partial or total mechanisation of the abattoir must be provided. Another necessary service is an effective system for disposing of all categories of waste, including effluent removal by means of straining or partial purification as required by South African environmental legislation. General consideration must be given to the distance from the production area to the market, since the tendency is to slaughter in the production area and then transport the meat rather than the live animals, as this prevents possible losses through stress, bruising, loss of bodyweight, and long distances between the abattoir, airport and shipping dock in the case of exports (Van Zyl, 1995). The proximity of a labour pool – keeping in mind reasonable access to public transport – must also be taken into account (Van Zyl, 1995).

Design and orientation of facilities: According to the European Commission (EC, 2004c) an export facility that complies with the necessary regulations and is able to operate in accordance with Hazard Analysis Critical Control Point (HACCP) based programmes, as set out in the EC's regulations, may be registered for its intended purpose with the controlling authority of the exporting country for export to the EU. In order to secure registration, the proposed facility must comply with the South African requirements for high-throughput abattoirs, as well as the specific requirements for the species being slaughtered and processed. In order to achieve this, proper planning is required. For example, the perimeter of the premises must be demarcated by means of a fence with lockable gates so as to control the unauthorised entry of vehicles, persons and animals, thus limiting the spread of infection and contamination. The layout of the site should be such that a linear flow can be maintained, with livestock reception on one side and product removal on the other. "Clean" and "dirty" areas must be separated according to their functions as follows: "Clean" areas include the rooms and spaces where carcasses and red offal are handled, chilled and frozen, as well as loading facilities for carcasses and red offal, washing facilities for meat transportation vehicles, offices and cloakrooms, toilets, showers, laundry facilities and canteens for the workers employed in such areas. "Dirty" areas, on the other hand, include the livestock entrance, lairage, washing facilities for animal transportation vehicles, stunning areas, dry-landing areas, bleeding areas, and

other areas and rooms where inedible offal is processed and where rough offal is handled, chilled and frozen. Areas where condemned products are handled, as well as the cloakrooms, toilets, showers, laundry facilities and canteens for those who work in or have access to these areas, are also classified as "dirty" areas (RSA, 2004).

Abattoir work areas: An ongoing attempt must be made to prevent the contamination of meat by organisms and other physical and chemical contaminants while moving through the process of transforming a living animal into food for human consumption. This can be achieved by the correct interior design of the abattoir, where the layout must particularly eliminate cross-flow between people and products. The facilities must furthermore be arranged in such a way that during processing, product flow is from dirtier to cleaner areas, zones or rooms. Products may not come into contact with the floor or walls, or even with equipment like platforms, and must remain within the building until dispatched. Drainage and air flow must be from clean to dirty, preferably in a concave drainage channel, and the product flow lines may not intersect. Products derived from slaughtering, dressing and evisceration must be removed from the slaughtering area as quickly as possible, and "warm" and "cold" working areas must be distinguished. Workers must be restricted to their designated working areas and must take the shortest route possible when moving to their respective workstations. Washbasins must be readily available to all workers, at a distance not exceeding three metres from any workstation that handles products, and must be mounted on top of dressing platforms and where manual equipment is in use. Sterilisers must be provided in combination with hand basins, while taps must foot- or knee-operated (RSA, 2004).

Flow patterns in wild game export facilities: Each area, and each function within that area, should be zoned. Such areas can be separated by distance and/or by physical barriers to restrict the movement of workers or limit their movement within specific areas. To promote the orderly execution of the functions within an export establishment, flow patterns are essential and must as far as possible keep to the sequence in which animals are received and transformed into meat and edible and inedible by-products. The functions can be divided into the following flow patterns:

Reception: This is the area where wild game carcasses are received, provisionally inspected and chilled prior to dressing. This area usually includes a room where the red offal accompanying the carcasses can be inspected, as well as a room where suspect carcasses can be detained for secondary inspection (RSA, 1999; RSA, 2004; RSA, 2006; Van Zyl, 1995).

Slaughter and dressing: This area is equipped for the dressing of carcasses under hygienic conditions, as well as the final inspection of meat. It also provides facilities for the detention of suspect carcasses requiring secondary inspection (RSA, 1999; RSA, 2004; RSA, 2006; Van Zyl, 1995).

Chilling and dispatch: This area provides for the chilling of carcasses to ensure the quality and optimal shelf-life of the product. Provision is made for freezer facilities for the storing of provisionally approved carcasses and for the sorting and dispatch of carcasses in a chilled area to ensure that the cold chain is maintained (RSA, 1999; RSA, 2004; RSA, 2006; Van Zyl, 1995).

Offal processing: This area includes facilities for the primary washing and sometimes further processing of edible offal, as well as the sorting, grading and weighing of hides and skins, the processing of by-products such as carcass meal and tallow, and a pre-purification plant. Here the quality of the effluent discharged into the sewerage system is improved, the levy for industrial effluent is reduced, and disposal of solid waste such as paunch and intestinal contents is facilitated (RSA, 1999; RSA, 2004; RSA, 2006; Van Zyl, 1995).

Cutting and processing plants: Depending on the final product to be produced, a cutting plant is provided as the area where whole carcasses are dissected and cut into primal cuts and/or further cut into steaks, or minced for the production of patties, for example. A processing plant is where the final products are exposed to heat treatment for the production of cuisine products or other processed meat products. These cutting plants are normally on the same premises or adjacent to abattoirs in order to keep the cold chain operating at an environmental temperature not exceeding 12°C, except in designated areas where the cooking process takes place (RSA, 2004).

Equipment and utensils: All equipment should be made of corrosion-resistant material and be specifically designed and purpose-made for the functions to be performed. Equipment must be easy to dismantle and clean. No holes or open-ended pipes are permitted, while platforms and sterilisers must be drained in order to prevent stagnant pools and to facilitate cleaning and sterilisation.

Approval of establishments: Once everything is in place and the food business operator can demonstrate to the controlling authority that the facility complies with the requirements as discussed, and with all relevant food laws and regulations, the facility will be registered for export purposes. Once all the required procedures are in place and the workers have been properly trained, the facility can go into operation (EC, 2004a; EC, 2004b, EC, 2004c).

2.5 ARRIVAL AT EXPORT FACILITY: GOVERNANCE, GUIDELINES AND LEGISLATION

Offloading of partially dressed game carcasses at the processing plant: At the export establishment, the official state veterinarian, appointed at the facility by the controlling authority in accordance with EU legislation (EC, 2004c), will verify that the seal numbers correspond with the accompanying documentation and that the number of partially dressed game carcasses and their tag numbers concur with the information provided. The veterinarian will also note the temperatures of the carcasses and, with reference to the trip thermograph, verify that the last-harvested carcasses do not display temperatures exceeding 7 °C. At least five per cent of animals harvested must be tested by means of measuring deep-bone temperature with a calibrated thermometer. The veterinarian will supervise the storage of partially dressed game carcasses in the holding chillers, record the date and time of arrival, make note of the tag numbers, and place on record the original certificate of origin and health attestation. (This document is important for purposes of certification, traceability and reconciliation of the mass of meat exported with the mass of carcasses received, and the official veterinarian must create a reconciliation sheet for this purpose). All game carcasses intended for export

to the EU must be matured at a temperature above 2°C for at least 24 hours prior to de-boning. The carcasses will therefore only be released by the state veterinarian after the thermograph record has been evaluated and found to be within specifications.

Carcass inspection at the game processing plant: It is the duty of the PSV to supervise the post-mortem inspection of all partially dressed game carcasses. The veterinarian must ensure that all partially dressed game carcasses are suitable for processing into export game meat, taking into consideration the information provided on the certificate of origin. The veterinarian must keep record of all checks and monitoring activities, as well as the corrective action taken in cases of non-compliance. The frequency of such checks must be based on performance. All suspect game carcasses must be inspected by the official state veterinarian, who must make a final decision on whether or not the meat from such suspect carcasses is suitable for export. This decision must be placed on record, along with the laboratory procedures that may be required for this purpose. Such laboratory results must be recorded and correlated to the tag numbers of the carcasses in question. Records must be kept of all carcasses not fit for export, along with reasons in each case, and these carcasses must be condemned. The official state veterinarian must also ensure that the necessary samples for residue monitoring are taken (RSA, 2008). Once the partially dressed game carcasses are released after maturation, they are dressed and presented for post-mortem meat inspection. The meat inspection team must be aware of all the relevant information provided in the health attestation and certificate of origin, to be taken into consideration in the meat inspection. Care must be taken during the dressing of the carcasses to ensure that any sign or evidence of disease or other condition, contamination or soiling is removed by washing, trimming or other means prior to meat inspection. No lymph nodes may be removed prior to meat inspection. The head and feet and the rough and red offal must at all times be identifiable with the carcass of origin, if not inspected at the depot. The results of the ante-mortem inspection in the field, as well as the primary and secondary meat inspections, must be recorded and communicated to the official veterinarian at the processing plant. Where zoonotic and notifiable diseases are diagnosed, the official veterinarian must be notified on the day of slaughter. Carcasses of solipeds must be

examined for trichinosis and the necessary samples for analysis must be taken (EC, 2005b). During the primary inspection of wild game carcasses, the inspection personnel should concentrate on the information provided by the field game examiners, as well as the detecting of any abnormalities not resulting from the hunting process. It should be verified that death was not caused by anything other than hunting.

2.6 OFFICIAL CONTROL OF OPERATING PROCEDURES

Any operator seeking to export wild game meat to the EU must comply with the official control measures, including audits of good hygiene practices and HACCP-based procedures (EC, 2004c). Such audits must be performed by an official veterinarian and must include the process spectrum, i.e. the communication of inspection results, information on the food chain, as well as decisions concerning live animals, animal welfare and meat. The official veterinarian may be assisted by auxiliary staff members, provided that they work independently from the business operator. The number of official staff members required must be determined through a risk-based approach. Guidelines regarding the hygiene of foodstuffs for export to the EU are specified by the European Commission (EC, 2004a; EC, 2004b; EC, 2004c). Most of these requirements are already in force in South Africa and are covered by the Meat Safety Act, Act 40 of 2000 (RSA, 2000) and the Red Meat Regulations promulgated under the Act, R1072 of 2004 (RSA, 2004).

Hygiene operating systems: European Commission Regulation 852 (EC, 2004a) requires that food operators establish and operate food safety programmes and procedures based on HACCP principles. However, HACCP principles should not be regarded as a means of self-regulation and should not replace official controls. It is the function and responsibility of the food business operator to implement and submit his/her hygiene management systems to the controlling authority for approval. Furthermore, it is the operator's responsibility to continuously validate the efficiency of such a system. The controlling authority can, however, guide the implementation of

hygiene rules by the setting of objectives such as pathogen-reduction targets or performance standards and by the monitoring of traceability systems for food and food ingredients as an essential element in ensuring food safety.

It is the function of the PSV to verify that such a hygiene management system is in place and that the hygiene control programmes (also known as prerequisite programmes) and associated monitoring systems reflect an accurate representation of the systems and procedures implemented at the establishment to ensure the highest possible hygiene standards and the safety of the game meat produced for export. All records of the verification of procedures must be kept and made available for auditing by the national controlling authority, as well as representatives of the importing countries. Apart from schematic plans, flow diagrams and hazard identification, the owner of the facility must provide the controlling authority with a documented hygiene management system or control programme containing detailed information on measures to be taken to monitor identified control points, including the methods of monitoring or checking these control points for approval. The owner must produce all relevant records of observations/checks/measurements/results/sampling programmes for laboratory analysis, along with the names of accredited laboratories capable of doing the required analyses. The owner must provide written accounts of decisions relating to corrective actions when taken and must assess the hygiene status of the abattoir by means of the hygiene assessment system, with results to be provided to the PCA for verification as frequently as required. An effective document management system must provide for the retrieval of documents relating to an identified production batch (traceability). A register for the recording of each production batch – containing information on date of harvesting, species, mass/quantities, identification (tag numbers) and destination – must be provided, along with a documented product recall procedure approved by the provincial executive officer and, in the case of EU exports, the controlling authority. As part of the hygiene management control programme approved by the controlling authority, certain control programmes must be initiated to ensure that the products produced by the business operators comply with the minimum

requirements set by the importing country. This is done through the evaluation of test results presented by the export business operators, as well as the verification and validation of sample results through their own control programmes. This will demonstrate risk management through risk analysis as part of the hygiene management system, as well as risk assessment based on the available scientific evidence and undertaken in an independent, objective and transparent manner, as required by the EU (EC, 2002; EC, 2004a). Any non-compliance must be taken up with the business operator in view of implementing corrective actions. The controlling authority must approve the nature of the corrective actions to be taken and must consider the business operator's past record with regard to non-compliance (EC, 2004c).

Microbiology of meat, process hygiene and equipment: The safety of foodstuffs must be ensured by a preventative approach, to be achieved by the implementation of good hygiene practices and the application of procedures based on HACCP principles. Microbiological criteria can be used in the validation and verification of HACCP procedures and other hygiene control measures (EC, 2005a). According to Article 4 of Regulation 852 (EC, 2004a), food business operators must comply with certain microbiological criteria for foodstuffs, including testing against the values set for the criteria through the taking of samples, the conducting of analyses, and the implementation of corrective actions in accordance with instructions given by the competent authority. Although South African meat safety legislation is based on HACCP principles, microbiological monitoring of meat, meat preparations and meat products, as well as the monitoring process for hygiene – which includes the microbiological monitoring of equipment and food contact surfaces as prescribed by the EU – are not covered. It was therefore necessary for South Africa to prescribe additional procedures at export facilities in order to standardise their microbiological testing programmes. In pursuit of this, South African authorities developed a microbiological monitoring programme that complies with the requirements set out in the European Commission regulations (EC, 2005a), including standardised sampling plans, the sampling of transportation procedures and analytical methods, and the

verification of laboratory proficiency (RSA, 2010d). This programme includes the sampling of meat and the monitoring of in-process hygiene through the taking of meat-surface samples, as well as the testing of surfaces to monitor the cleanliness of equipment. All sampling methods, the number of samples to be taken, the frequency of sampling, the procedures for laboratory analysis, the laboratory techniques, the handling of samples and the format of reporting are prescribed. The results obtained are then measured against the maximum allowable meat microbiological levels and, in the case of work surfaces, the mean values for the number of colonies are determined (RSA, 2010d). This is necessary in order to establish trends in the test results, which are then able to reveal unwanted developments in the manufacturing process, thus enabling management to take corrective actions before the situation gets out of control (EC, 2005a).

Frequency of sampling: Each week, hindquarter, forequarter and flank samples must be taken from pre-chilled carcasses. Samples must also be taken from individual primal cuts and individual cartons of packed meat for the retail market, and these must be microbiologically tested for salmonella and *Escherichia coli* (*E. coli*), while a total plate count must be performed (RSA, 2010d).

Responsibility of the facility owner: Management is responsible for initiating microbiological testing at the facility and must meet all the costs involved. All the results obtained from the programme must be recorded by management in a prescribed format, which includes the graphical depiction of the average of all microbiological sample results for aerobic colony counts obtained for each week, where average results are plotted against every week of the year. Separate graphs must be compiled for each of the three categories tested, namely carcasses, primal cuts and retail cuts, and for each species tested. The results must then be made available to the official veterinarian, normally stationed at the facility. Where any unsatisfactory results were obtained, management must initiate corrective actions immediately (RSA, 2010d).

Responsibility of the controlling authority: It is the responsibility of the official veterinarian at an export facility to review all microbiological testing results obtained and to use the information to evaluate the overall efficiency of the hygiene management

systems in place at the establishment. He/she should investigate all instances where unsatisfactory results were obtained and inform management and the controlling authority should any negative trends arise. The official veterinarian must ensure that corrective actions are implemented and, should it be deemed necessary, that additional sampling is performed. As part of the microbiological programme enforced by the controlling authority, the official veterinarian must collect control samples every three months and submit them to an officially approved laboratory. The results of these tests must verify the results obtained by management (RSA, 2010d).

Evaluation of results: The microbiological status of meat must be used as an indicator of the adequacy of process hygiene. The results of microbiological meat tests for every year must be plotted on graphs and the results compared with the results of the microbiological tests of the water supply and equipment. This gives an overall picture of the microbiological status of the establishment and its products. Parameters that deviate from maximum acceptable levels must be investigated as soon as individual results and/or trend lines indicate an increase in the plate count. Specimens must then be collected daily and an attempt must be made to find the cause before the maximum acceptable geometric mean levels are reached. The geometric mean of the results from the previous three weeks must comply with the requirements for the total plate count and must be compared with the trend line on a graph. Both the trend line and the geometric mean are indicators of bacteriological contamination. If the official veterinarian finds that individual results, or the geometric mean of three consecutive results, exceed the maximum allowable levels, he/she can investigate the effectiveness of corrective actions and cease export certification. The exact date from which export certification must cease is the first day on which unacceptable results are reported. Production and export certification may be resumed on the day on which the parameters return to levels of compliance. Laboratories must store split samples received in order to maintain the integrity of the samples for follow-up analysis or for validation of the system (RSA, 2010d).

Water quality:

Bacteriological and chemical quality: As water is ingested directly or indirectly, thus contributing to the overall exposure of a consumer to ingested substances, which may include chemical and microbiological contaminants, it must comply with the requirements set by EU legislation regarding the quality of water intended for human consumption (EC, 2002), which states that member states shall set values applicable to water intended for human consumption for the parameters set out in a council directive (EC, 1998) on the quality of water intended for human consumption. The controlling authority of the exporting country must take appropriate measures to reduce or eliminate the risk of non-compliance with the parametric values. The controlling authority must measure all necessary parameters to ensure that regular monitoring of the quality of water intended for human consumption is carried out, to check that the water available to consumers meets the requirements as per the council directive (EC, 1998). In order to meet these requirements, particular standards for the monitoring of water quality were developed by the controlling authority.

Responsibility of the management of individual establishments: Any facility seeking to export game meat to the EU must be able to demonstrate the ability to ensure an adequate supply of water that complies with both bacteriological and chemical standards and which must be available at all times during operation. The controlling authority must monitor and verify that these standards are met. A water-sampling programme that is representative of the water supply of the establishment must be conducted by the abattoir management as part of a facility's hygiene management system. The hygiene management programme for water quality, as prescribed by the Red Meat Regulations (RSA, 2004) requires the management of an establishment to provide a plan of the premises indicating the water distribution network and position of storage tanks and outlets. The water must be tested at regular intervals as prescribed, with the results to be kept on record. The residual chlorine levels of water must be monitored by daily testing, and bacteriological testing for total coliforms, faecal streptococci, *E. coli* and total plate counts must be performed weekly. Testing for heavy metals must take place annually (SABS, 2006). Apart from conducting their

own tests, management must collect duplicate internal control samples every three months. One specimen must be tested by the local laboratory and the other by the reference laboratory (RSA, 2007c). The results of the checks, inter-laboratory comparisons and proficiency testing programmes must be provided to the PSV for interpretation and evaluation. Water sampling programmes are only as valid as the competency and reliability of the laboratory performing the analyses. Therefore, only laboratories that are part of the reference laboratory system and which perform tests according to acceptable laboratory techniques may be used for the analysis of water samples so as to ensure accurate evaluation and consistency of results. In order to validate water sample analyses, laboratory reports should reflect the date and time of receipt of the sample at the laboratory, the temperature of the sample, the proper identification of the sample (especially pertaining to the point of collection), confirmation that the prescribed collection method was followed (if the sample was collected by personnel of the laboratory doing the analysis), as well as confirmation that the prescribed transport and handling procedures were followed at the laboratory. The reports must also provide the date and time of analysis, as well as the results and the range of criteria for evaluation (RSA, 2007c).

Frequency of sampling: Testing for heavy metals must be done annually by both the controlling authority and the establishment, whilst the controlling authority must also test for the presence of pesticides and polycyclic aromatic hydrocarbons on an annual basis. Testing for total coliforms, faecal streptococci, *E. coli* and total plate counts must be done quarterly by the controlling authority and weekly by the establishment, while testing for residual chlorine must be done daily by the establishment to ensure that it remains within permissible levels of 0.2 - 0.5 ppm. Nitrates, nitrites and ammonium (depending on risk) must also be tested on an annual basis by the controlling authority. Physico-chemical tests must also be performed, as prescribed by the management of the establishment (RSA, 2007c).

***Governance*:** In providing the necessary assurances to the importing country, the controlling authority needs to verify the safety of the products produced in the

establishment. An official veterinarian must therefore be present in order to validate the claims made by the establishment and to certify its products.

Responsibility of official veterinarian: The official veterinarian must keep copies of all water-testing results, review them and take them into account in making a decision on the product's suitability for export. The veterinarian must collect his/her own water samples and have them tested at regular intervals. The veterinarian can also collect duplicates of the official external control samples every three months and submit one specimen to the local laboratory and one specimen to the reference laboratory. The results of these tests must verify the results of the internal control tests managed by the reference laboratory. Official sampling may not replace the checks conducted by management (RSA, 2007c).

Interpretation of test results: Physico-chemical test results are judged on their own merit by the official veterinarian against acceptable values from the importing country. All other water-test results are plotted on graphs to indicate trends in bacteriological and chlorine levels, as in the case of the meat and in-process micro-bacteriological sampling programme. The results are compared with the results of microbiological tests on the product and environment. The holistic picture of the microbiological status of the establishment and its products must always be available and, by using the geometric mean of previous results, it is the preferred method of evaluating the results of individual tests. Parameters that deviate from maximum acceptable levels must be investigated as soon as individual results and/or the trend line indicate an increase in the plate count. Samples must then be collected daily instead of weekly, and an attempt must be made to find the cause before the maximum acceptable geometric mean levels are reached. The official veterinarian must halt production and refuse export certification if the geometric mean of the regular microbiological results is not within the parameters. The exact date on which export certification must cease is the first day on which unacceptable results are reported. Production and export certification may be resumed on the day that the parameters return to levels of compliance (RSA, 2007c).

Residue control: Residue control is regarded as one of the major control programmes that must be in place for countries seeking to export meat or animal products to the EU. Council Directive 96/23/EC (EC, 1996) states that the import of animals and animal products into the EU is subject to the submission of a plan setting out the guarantees offered with regard to the monitoring of groups of residues and substances as required. Countries must adhere to a prescribed programme to ensure that the products destined for exports comply with the importing country's requirements and are safe for human consumption. The National Department of Agriculture, Forestry and Fisheries has designed and implemented a residue programme that was approved by the EU Commission. However, during an official audit by the EU delegation in 2006, it was noted that the turnaround time (the time difference between the collection of the sample and the final reporting of the results) was not sufficient and that the Department should first concentrate on the priority commodities (commodities approved for export to EU countries) until such time as the identified problems have been addressed. The only commodities that are approved for export to EU countries are crocodile meat, farmed game (ostrich) meat, and wild game meat. This problem was subsequently addressed, and the time span between sample collection and the reporting of the results is now six weeks (Roux & Ndadza, 2009). The EU recommendations included extra substances in the programme and the collection of blood samples from live ostriches on all export-approved farms in South Africa. It was also suggested that feed samples from all registered farms be included to ensure compliance with EU requirements. Muscle, tissue, blood, urine and feed samples are collected at EU-approved meat establishments and farms, and the samples are then analysed for veterinary drug residues, growth stimulants, pesticides and chemical environmental contaminants. The programme, known as the National Residue Control Programme, is running concurrently with the National Residue Monitoring Programme, which is applicable to export facilities and farms in the Southern African Development Community (SADC), as well as the local market. Sampling is carried out in variable intervals spread over the entire year, as some substances are administered only in particular seasons. The residue control plan is aimed at detecting all illegal treatment while controlling compliance with no more

than the maximum residue limits (MRL) for veterinary drugs and pesticides as per national or international regulations, and for purposes of possible surveillance and revelation of the reasons for residue in food of animal origin (RSA, 2008).

2.7 DISPATCH AND CERTIFICATION OF PRODUCTS

Wrapping, packing and labelling of products: The wrapping, packing and labelling of products play an important role in both the hygiene and traceability of products. Hygiene legislation requires a special hygiene program for in-contact wrapping material (EC, 2004a). All labels used on meat must be printed on food-grade paper or plastic printing material and must also be treated in the same hygienic way as in-contact wrapping material. Any wrapping material bearing the mark of approval of the product may not be reused after opening. In the case of bulk packaging, containers or cartons must be clearly marked, with a facsimile of the mark of approval clearly visible and of readable size. All containers must be clearly marked on both ends with the required information (RSA, 1990), as well as the name, address and registration number of the establishments in which the meat was packed. This application must also give an accurate description of the contents of the container, the nett weight of the contents, the date packaged – or a code that enables the date of packaging to be determined – and the temperature at which the product must be stored. All cartons must be sealed and must bear stick-on labels on which the health mark of the establishment has been printed. All the labels must be numbered with consecutive serial numbers, and labels must be applied to each carton in such a way that they can be assured of not falling apart when then the carton is opened. Serial numbers for cartons packed on each day must be recorded and be made available for inspection in order to prevent unauthorised use (RSA, 2007b).

Inspection of export consignments: Prior to signing the international export certificate, the official veterinarian must inspect all export consignments and must verify by means of spot-checks that the cartons in the consignment are correctly marked and labelled

and that labels are applied in such a way that they will be destroyed when the carton is opened (EC, 2004b). Special attention must be paid to the core and surface temperatures of the products at the time of loading, as well as the cleanliness of the vehicle/container before loading, the temperature of the loading space at the time of loading, and the condition of the cartons to be dispatched. Finally, the veterinarian must verify the details required by the importing country (RSA, 2007b).

Export certification: As exports are a national competency, the national veterinary administration has to authorise the provincial authority to certify export commodities on its behalf. The provincial authority, in turn, must authorise the certifying veterinarian to certify on its behalf. Such authorisation must be issued in writing, and the veterinary authority must ensure that official veterinarians with powers of certification have satisfactory knowledge of veterinary legislation and working procedures with regard to the commodities to be certified, and that they are informed about the rules to be followed when drawing up and issuing export certificates. Veterinarians with official certification powers must be kept abreast of the latest versions of agreed-upon veterinary health certificates, as well as any changes to the import conditions and requirements on the part of importing countries. International trade involves ongoing ethical responsibility amongst the relevant veterinary administrations. Therefore, if the veterinary authority becomes aware of the occurrence or reoccurrence of a disease that has been included in the international animal health certificate, they are obliged to notify the veterinary administration, who in turn must notify the veterinary administration of the importing country. This is necessary in order that imported assignments may be inspected or tested and appropriate action can be taken to limit the spread of the disease. The veterinary authority must take all the necessary steps to ensure the integrity of the certification, and must conduct such checks and implement such control measures as necessary to prevent the issuing of false or misleading certification (RSA, 2007d).

Certification of official veterinarians: Official veterinarians are authorised to perform their duties by virtue of registration under the Animal Diseases Act, Act 35 of 1984 (RSA, 1984) and the Meat Safety Act, Act 40 of 2000 (RSA, 2000). Official

veterinarians with certification powers will only certify data or information of which they have personal knowledge or which they can personally verify or ascertain in writing. In this respect, the authorisation of a certifying official veterinarian may be restricted to commodities originating from a specific region or a specific establishment. However, the certifying official veterinarian may certify data of another official acting under his/her control, provided that he/she can verify the accuracy of the data obtained, within the context of official monitoring programmes and with reference to officially accredited quality assurance schemes, or by means of an epidemiological surveillance programme authorised in terms of veterinary legislation (RSA, 2007d).

Export certificates are negotiated and drawn up by the controlling authority and presented to the official certifying veterinarians. The veterinarian is issued with blank, uniquely numbered certificate papers, bearing the official authentic watermark, which he/she signs in order to print certificates when needed. The papers are numbered so that their use may be audited and missing numbers can be accounted for. Export certificates must provide for the identification of the animals or animal products to be certified, and different model certificates developed for the various commodities must be used. The correct certificate must be chosen from the veterinary administration database. Certificates may not be changed or manipulated in any way by the veterinary authority or the certifying veterinarian. Only original certificates may be issued and presented to exporters. Copies may be used for administration purposes, but may not be printed on the original certificate paper. When signing an export certificate, the official certifying veterinarian must ensure that he/she is familiar with the contents of the document to be signed, as well as the requirements of all legislation to which reference is made in the certificate.

If the original health certificate does not accompany the shipment from the point of loading to the point of export, the commodity to be exported must be sealed and moved to the point of export with an official export movement permit (RSA, 2007d).

2.8 CONCLUSION

The EU, through its legislations and directives, sets clear guidelines for countries seeking to trade with the EU in commodities of animal origin. These rules, including those relating to food hygiene, and the procedures for verifying compliance with such, are intended to help achieve a high level of protection of human health. The regulations contain common principles, particularly in relation to the manufacturers' and competent authorities' responsibilities; structural, operational and hygiene requirements; procedures for the approval of establishments; requirements for storage and transport; and health marks and certification. Although the rules set by the EU are strict, the guidelines allow for flexibility at any stage of production where a unique situation is involved; however, flexibility may not compromise food hygiene objectives and should be fully transparent. Traceability of food and food ingredients is an essential element in ensuring food safety, and the EU has definite rules and procedures in place for addressing traceability in specific sectors of the relevant processes.

This review has reiterated the considerable responsibility on the exporting country, through its Veterinary Services, to ensure that there is effective control over the disease status of export products. To this end, various structures and control measures have been put in place to effectively control animal diseases and to give assurances to the international community regarding the safety of products of animal origin. Although South Africa is for various reasons experiencing difficulty in convincing certain countries of its animal disease status, the wild game industry – through discipline within the industry and stringent control measures that demonstrate transparency – has managed to convince the EU that it possesses the ability to meet the demands of international trade requirements. South African meat safety legislation is in line with what is required for EU exports and, combined with the veterinary procedural notices that set out the standard operating procedures to be followed in order to exercise the necessary control over the processes put in place by facility owners not only meets, but even surpasses the minimum requirements set by the EU.

The export status of the country is of utmost importance to the wild game industry, which stands to lose the most should EU exports be banned. Fortunately, the country has proven its ability to compete in the international game meat market, but the challenge lies in maintaining the country's export status by means of continuous improvement of the disease control status and in addressing the problems facing the wild game industry. The animal health disease status and the level of protection regarding food safety standards as required for international trade are being threatened by a shortage of resources within the controlling authority in South Africa. The appointment of sufficiently knowledgeable personnel with the necessary operational resources to exercise their responsibilities remains a challenge.

This review further reveals that the wild game meat industry, especially for export purposes, relies heavily on game harvesters who must take responsibility for hygienic harvesting practices, as well as for field game-meat inspection. Whether the game harvesters are adhering to the necessary practices are questionable and may constitute a risk to the game export industry, because of lack of supervision and control by the industry and the controlling authority. Although the majority of the harvesters may perform an admirable task, most of them are harvesting for recreational purposes and do not practise game harvesting as a full-time profession. Both the industry and the controlling authority place much responsibility on these individuals who would be least affected financially should exports be suspended. The veterinary controlling authority, due to human resource and infrastructural constraints, sometimes has limited control over harvesters and field game-meat examiners apart from registering them. There are, however, some provinces where official field game meat inspections are performed.

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Chapter 3

A SURVEY OF WILD GAME PRODUCTION AND UTILISATION IN THE XHARIEP DISTRICT

This chapter has been submitted partially or in full for publication in the Journal of Muscle Foods; ISSN 1046-0756.

ABSTRACT

Against the backdrop of socio-economic hardship in the district and evidence of an abundance of wild game, which earned valuable foreign currency for other provinces through the sale of game meat originating in this district, this study investigated wild game production and utilisation within the district in order to establish the potential for optimising this key resource into sustainable industries that could have an impact on poverty alleviation through the creation of direct and indirect employment opportunities. A questionnaire was designed and compiled to gather information on farming practices; the size of farming land; additional land for keeping game; species of game; the use of growth hormones, supplements and pesticides; the marketing and utilisation of game; and whether harvesting for the export market is used as a marketing method. A random sample of farmers was selected to receive questionnaires. A total of 185 questionnaires were returned, and the results obtained from those respondents were utilised and statistically analysed. Nearly 600 000 hectares of farmland, representing 23.5% of the 2.5 million hectares classified as natural grazing in the district, were covered by the survey. Nearly 70% had game and/or had land available for game farming. Significant potential exists for the expansion of the game industry, as several respondents indicated that they were interested in expanding their game production and that they had land available for this purpose. From the survey it can be deduced that game production in the area covered by the survey can be increased by at least one-third of the existing numbers. The majority of farmers were not using food additives or pesticides that could leave chemical residues in the meat, and nearly one-quarter of the respondents keeping game had already utilised game harvesting for the export market in combination with other ways as a method of controlling game numbers. Moreover, several respondents indicated that they would be willing to change their current marketing strategies to include this method of controlling game numbers. The establishment of an export wild game facility in the district appears feasible, confirmed by the fact that nearly 70% of respondents were in favour of such a project.

3.1 INTRODUCTION

As early as 1991, Terblanche found that the majority of farms carrying game in the Free State province were situated in the Xhariep district in the southern and south-western parts of the province (Terblanche, 1991). The Free State is the third largest producer of wild game meat for the game meat export market and supplied in excess of 400 tons of game during recent harvesting years, of which nearly 150 tons originated from the Xhariep district (SAOBC, 2009). Springbuck is the most abundant species found in the region, and of a total of 64 565 springbuck on private farms in the Free State in 1991, 32 766 were found on farms in the Xhariep area, representing 50.7% of the total springbuck population at the time (Terblanche, 1991). According to Skinner and Louw (1996), lambing of springbuck can take place twice per year in times of adequate rainfall, and the normal cropping rate of 30% can be increased to 40%. An increase in the cropping rate of young lambs may also stimulate reproduction by inducing ewes that would otherwise have lactated, to further reproduction. The carcass yield of springbuck, according to Conroy and Gaigher (1982), is 58%, which should be utilised to the benefit of the district's inhabitants. However, despite this positive scenario, the Xhariep district remains one of the poorest in the country.

Considerable efforts are being made by the Xhariep district municipality to improve the quality of life of its residents by enhancing local economic development. According to available statistics (Stats SA, 1996), the unemployment rate in Xhariep is 28.9%, which is amongst the highest in the Free State (NDMC, 2009). The rate of unemployment causes males in the economically active age group to migrate to economically active areas, leaving their wives and families behind, which in turn contributes to the social problems experienced in the area (Davis, Tavasci & Marais, 2006). Local municipalities in the Xhariep district are relatively wealthy on the other hand, as they own land which they utilise to satisfy the needs of the broader community in terms of residential, industrial and economic development. In total, 93 342 hectares of land (Mohakare – 7 615 ha, Kopanong – 34 814 ha, Letsemeng – 50 913 ha) are owned in

the form of commonages. Commonages have the potential to make a significant contribution towards development in the more extensive and arid parts of the Free State by means of enhancing food security within the household, creating opportunities for micro entrepreneurs, and improving land reform by establishing plot holders and commercial farmers (NDMC, 2009).

AREA DESCRIPTION, COMPOSITION AND SIZE

The Xhariep district of the Free State borders the Lejweleputswa and Motheo districts to the north, the country of Lesotho to the east, the Eastern Cape and Northern Cape provinces to the south, and the province of the Western Cape to the west (FSPG, 2001). The Gariep River, South Africa's largest river, forms a natural border between the district and the Western Cape to the south and hosts the country's only two hydroelectric power stations situated in the Gariep and Van der Kloof dams (FIPA, 2009). The Xhariep district is the largest in the Free State and makes up 26% of the total area of the province. It comprises three local municipalities covering a total of 34 131.55 km² of land (Figure 3.1, Table 3.1). As can be seen from Table 3.1, there are 2 062 farms and 197 smallholdings within the Letsemeng local municipality, totalling 10 192.48 km² of land. Koponong has 3 059 farms covering 15 190.54 km² and Mohokare a total of 2 308 farms covering 8 748 km² of land. The three local municipal areas are made up of 17 urban centres (towns) and surrounding rural areas, of which Koffiefontein, Trompsburg and Zastron form the main centres (FSPG, 2001).

DEMOGRAPHIC PROFILE

In contrast to the large surface area, the Xhariep district has a very low population density, with the estimated population of 128 500 people comprising only 4.58% of the entire population of the Free State, i.e. 3.77 people per square kilometre (Table 3.2). The population distribution per local municipality is relatively even, with the majority (42%) residing in Kopanong and the remaining two areas comprising 29% and 28% of

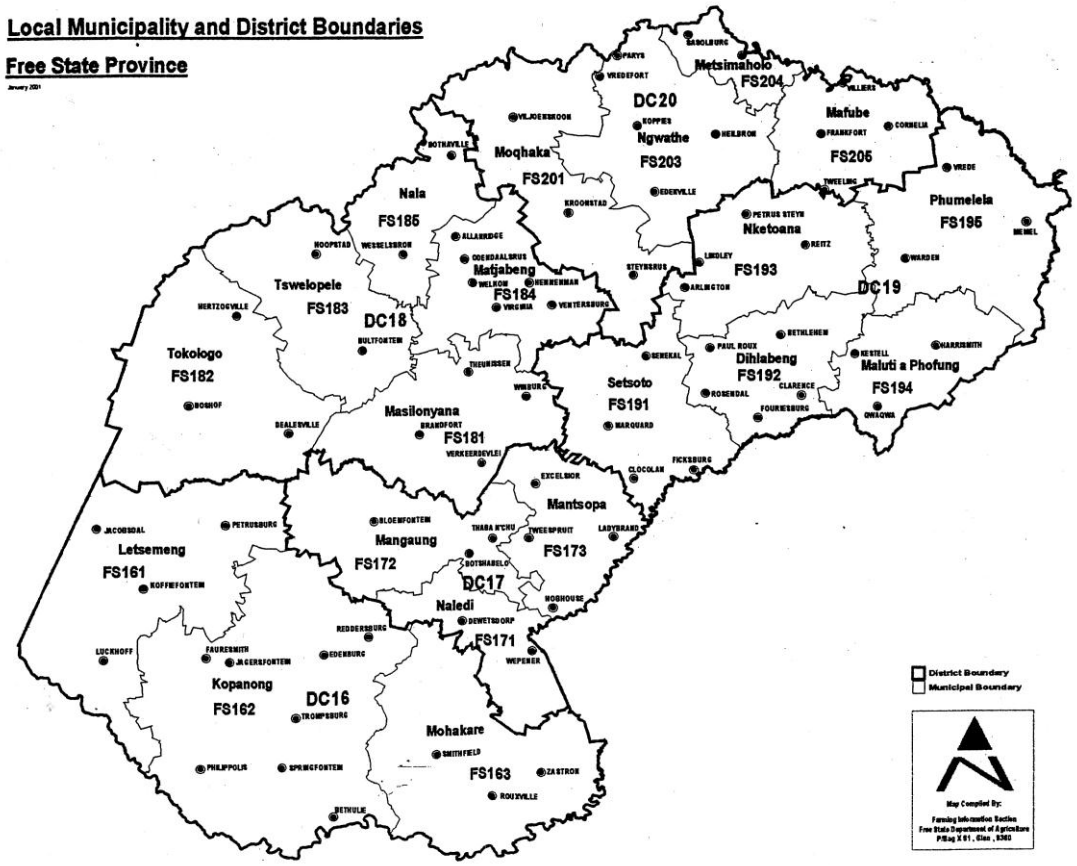

Figure 3.1 Local Municipality and District Boundaries of the Free State Province (FSDA, 2001)

Table 3.1 Composition and size of the Xhariep district

Local Municipality	Number of farms	Area in km²
Letsemeng	2 062 (*197)	10 192.48 km²
Kopanong	3 059	15 190.54 km²
Mohokare	2 308	8 748.53 km²
Total	**7 429 (* 197)**	**34 131.55 km²**

Note: (*197) number of smallholdings in addition to number of farms

Table 3.2 Population distribution per local municipal area, 2001

Area	Urban	Rural	Total	Percentage	Density (km^2)
Letsemeng	26 026	11 633	37 659	29.30 %	3.69
Kopanong	41 153	12 794	53 947	41.98 %	3.55
Mohokare	23 500	13 403	36 903	28.72%	4.22
Total/Average	**90 679**	**37 830**	**128 509**	**100.00 %**	**3.77**

Source: FSPG (2001) as adapted from Stats SA (1996)

the population respectively. A total of 90 670 people (70.5%) live in urban areas, whereas 37 830 (29.5%) live in rural areas (Davis *et al.*, 2006).

ECONOMIC PROFILE

Gross geographic product (GGP): The financial contributions of various economic sectors to the GGP of the individual local municipalities, as well as the district municipality as a whole, are indicated in Table 3.3. It is evident that the agricultural sector makes the biggest contribution (35.01%) overall to the GGP of the region as a whole. Apart from the services trade, the main contributors to the GGP of the district are the mining and manufacturing industries, which are mostly situated in the Letsemeng area. The Kopanong local municipality contributes most (42.41%) towards the total GGP of the district municipality, followed by Letsemeng (29.84%) and Mohokare (27.75%) respectively (FSPG, 2001).

Economic analysis: Considering the district municipality's total population of 128 509, the GGP is calculated at R4 605 per capita, making it the second lowest among all district municipalities in the Free State and only slightly higher than that of the Thabo Mofutsanyana district. The economy of the district is primarily dependent on agriculture, with very little to no diversification. This places the area at tremendous economic risk, especially considering the decline in the agricultural sector during recent years (FSPG, 2001).

Employment: The unemployment figures for the Xhariep district municipality are summarised in Table 3.4. The unemployment rate within this district municipality is among the highest in the province, at an average of 28.91% for the entire area. In general, the unemployment levels are relatively consistent amongst the local municipalities, with Mohokare (25.3%) showing slightly lower levels than the others. Letsemeng (30.4%) is the municipality and Luckhoff (52.99%) the town with the highest employment rate. It is important to note that where rural areas clearly have the

Table 3.3 GGP contribution per Sector, 1996 (R '000)

GGP Sector	Letsemeng	Kopanong	Mohokare	Xhariep Total	%Con-tribution
Agriculture	53 870.00	95 545.00	62 968.00	**212 383.00**	**35.90**
Mining	37 205.25	288.00	79.00	**37 572.25**	**6.35**
Manufacturing	1 766.15	564.00	187.00	**2 517.15**	**0.43**
Electricity/Water	1 225.00	3 622.00	4 469.00	**9 316.00**	**1.57**
Construction	147.05	77.00	728.00	**952.05**	**0.16**
Trade	14 875.45	25 699.00	33 795.00	**74 369.45**	**12.57**
Transport	8 722.00	19 235.00	10 934.00	**38 891.00**	**6.57**
Finance	37 493.90	33 341.00	21 164.00	**91 998.90**	**15.55**
Community	1 159.55	2 697.00	2 577.00	**6 433.55**	**1.09**
General Gov.	14 944.35	58 576.00	22 077.00	**95 597.35**	**16.17**
Other Producers	5 140.05	11 222.00	5 164.00	**21 526.05**	**3.64**
Total	**176 548.75**	**250 866.00**	**164 142.00**	**591 556.75**	**100.00**

Source: FSPG (2001) as adapted from Stats SA (1996)

Table 3.4 Summary of employment per municipality, 1996

Municipality	Town	Employed	Unemployed/ Looking for Work	Total Labour Force	Unem-ployment Rate(%)
	Jacobsdal	1 012	654	1 666	39.26
	Koffiefontein	2 002	1 370	3 372	40.63
LETSEMENG	Luckhoff	448	505	953	52.99
	Oppermans	NA	NA	NA	NA
	Petrusburg	1 226	664	1 890	35.13
	Letsemeng Rural	4 449	797	5 246	15.19
	Subtotal	**9 137**	**3 990**	**13 127**	**30.40**
	Bethulie	1 212	902	2 114	42.67
	Edenburg	835	671	1 506	44.56
	Fauresmith	654	481	1 135	42.38
KOPANONG	Gariepdam	346	78	424	18.40
	Jagersfontein	870	780	1 650	47.27
	Philippolis	521	513	1 034	49.61
	Reddersburg	866	428	1 294	33.08
	Springfontein	612	486	1 098	44.26
	Trompsburg	675	470	1 145	41.05
	Kopanong Rural	5 997	640	6 636	9.64
	Subtotal	**12 588**	**5 449**	**18 036**	**30.21**
	Rouxville	812	513	1 325	38.72
	Smithfield	854	550	1 404	39.17
MOHOKARE	Zastron	2 305	1 523	3 828	39.79
	Mohokare Rural	4 956	438	5 394	8.12
	Subtotal	**8 927**	**3 024**	**11 951**	**25.30**
XHARIEP DISTRICT TOTAL		**30 652**	**12 463**	**43 114**	**28.91**

Source: FSPG (2001) adapted from Stats SA (1996)

lowest unemployment rates, there is likely to be a higher level of poverty due to the adverse effect that the decline in the agricultural sector has had on employment potential in the rural areas over recent years.

Income: The income distribution of individuals follows much the same pattern across the Free State, with the majority of people not earning any formal income at all, or falling within the lower income brackets. Within the Xhariep district, 63.88% of respondents indicated during the 1996 census that they were earning no income whatsoever, while 27.79% were earning between R1 and R1 000 per month, 4.86% were earning between R1 001 and R2 500 per month, and only 3.47% of respondents were earning more than R2 500 per month. An analysis of these figures, in conjunction with the above-mentioned unemployment rates, provides a better understanding of the actual poverty levels within the region. A notable portion of the population is unemployed or earning a nominal income, which must be used to support a large number of dependants (FSPG, 2001).

INFRASTRUCTURE

The Xhariep is widely regarded as a notably scenic area with considerable tourism potential due to its unique topography, vegetation, wildlife and water availability (FSPG, 2001). One of the major strengths of this sparsely populated area is the abundance of natural resources, such as water and land, for agricultural practices (NDMC, 2009). The Xhariep Dam – the largest in South Africa –is situated in the Orange River at the southern tip of the district and also produces hydroelectric power (FIPA, 2009). The district consists of 17 towns with good roads, while three national roads – the N1 from Gauteng to Cape Town, the N6 between the Eastern Cape and Bloemfontein, and the N8 between Bloemfontein and Kimberley – pass through. The district boasts three nature reserves and a strong livestock farming community with ample agricultural opportunities. It is a relatively crime-free area that offers a good environment for investment (NDMC, 2009).

AGRICULTURAL/FARMING PRACTICES

The Xhariep district is predominantly agriculturally oriented with activities varying from hardened livestock farming to various types of crop farming. At present, 7 429 farms can be found in an area of 2.79 million hectares, of which 2.5 million hectares (86% of the area) are classified as natural grazing suitable for extensive small- and large-stock farming. In the eastern parts, the carrying capacity is five hectares per large stock unit compared to 14 hectares per large stock unit in the more arid western parts. The predominant farming activities in the region are sheep and ostrich farming (FIPA, 2009). A total of 36 000 hectares are under irrigation, producing grapes, maize, wheat, lucerne and cotton, and 166 000 hectares are cropped as dry land for winter crops such as maize, wheat and sunflower. Of the total area, 54 000 hectares of commonages belonging to local municipalities are also used for farming (FSDA, 2006; NDMC, 2009).

Game farming: There is an abundance of wild game in the Xhariep region of the Free State (Terblanche, 1991). The number of game farmers has increased dramatically over time as more and more stock farmers are changing over to game farming for reasons including economic fluctuations due to the poor yield generated by stock farming; the importation of cheaper beef, mutton and poultry meat; increasing stock theft; strict labour laws, and ever increasing input costs (Erasmus, 2000).

Game meat exports: Table 3.5 shows that 85 535 head of game were harvested in South Africa in the 2008 calendar year, of which 15 176 (17.74%) were harvested in the Free State. Of these, 48.89% – nearly half – came from the Xhariep district. Since game varies in size, and keeping in mind that only deboned game meat may be exported, a more holistic picture of the economic value of game meat exports can be obtained if the mass of the meat is taken into account. Total game meat exports during 2008 comprised 2 232 967 tons, of which 421 458 tons (18.87%) came from the Free State. Of this latter quantity, 149 949 tons (35.57%) originated from the Xhariep

Table 3.5* Total game numbers harvested for export purposes in South Africa

	Total for Country		Total for Free State			Total for Xhariep		
Species	No. of game	Kg of game meat	No. of game	Kg of game meat	% of Country (No.)	No. of game	Kg of game meat	% of Total Province
Springbuck	59969	910927.36	8938	130101.40	14.90	6405.00	93638.40	71.66
Blesbuck	12022	426962.57	4565	162456.80	37.97	588.00	21429.50	12.88
Gemsbuck	764	74573.60	76	7654.80	9.95	10.00	1116.00	13.16
Kudu	3542	279888.30	36	2379.20	1.02	36.00	2379.20	100.00
Eland	149	26498.41	33	6009.70	22.15	24.00	4659.30	72.73
Rhebuck	133	2132.12	1	18.00	0.75	1.00	18.00	100.00
Impala	3783	86862.78	8	226.20	0.21	0.00	0.00	0.00
Black Wildebeest	2285	160873.04	1070	73876.54	46.83	232.00	16808.80	21.68
Blue Wildebeest	1755	162072.27	188	19995.70	10.71	24.00	2741.80	12.77
Red Hartebeest	300	21705.71	242	17468.01	80.67	99.00	7154.00	40.91
Duiker	254	2437.10	0	0.00	0.00	0.00	0.00	0.00
Zebra	364	67477.40	0	0.00	0.00	0.00	0.00	0.00
Deer	36	1773.40	19	1272.40	52.78	0.00	0.00	0.00
Nyala	2	101.00	0	0.00	0.00	0.00	0.00	0.00
Waterbuck	62	5678.20	0	0.00	0.00	0.00	0.00	0.00
Steenbuck	2	12.00	0	0.00	0.00	0.00	0.00	0.00
Bushbuck	3	82.40	0	0.00	0.00	0.00	0.00	0.00
Fallow Deer	110	2909.50	0	0.00	0.00	0.00	0.00	0.00
TOTAL	**85535**	**2232967.16**	**15176**	**421458.80**	**17.74**	**7419.00**	**149949.5**	**48.89**

***** Results reflect 2008 data

district. However, this seemingly small quantity is still substantial, since the meat is harvested from smaller game such as the springbuck, which is more abundant in the Xhariep district. Of the total number of springbuck harvested in the Free State, the Xhariep district contributed 71.66% (Table 3.5). Since the implementation of the game farm registration system in 2003, the Xhariep district has registered 253 farms for compliance with export requirements in view of the harvesting of wild game for export purposes, as reflected in Table 3.6. These farms are spread across the district, with the majority (163) situated in the Kopanong municipal area, followed by the Letsemeng municipal area with 74 and the Mohokare municipal area with 16 registered farms. Against the backdrop of the poverty in the Xhariep district, combined with the abundance of game produced within the district and the fact that other provinces earned foreign currency from game meat produced within the Xhariep district, this study was instituted to investigate wild game production and utilisation within the district in order to establish the potential for optimising this key resource to be developed into sustainable industries that could have a significant impact on poverty alleviation through the creation of direct and indirect employment opportunities.

3.2 METHODOLOGY

After taking into consideration the farming practices, the evidence of game numbers, the socio-economic situation of the district under surveillance, as well as South African legislation regarding animal health and meat safety and European Union (EU) requirements for the trade in wild game meat, a comprehensive questionnaire was compiled with questions designed to gather information on farming practices; the size of farming land; additional land for keeping game; species of game; the use of growth hormones, supplements and pesticides; the marketing and utilisation of game, and whether harvesting for the export market takes place on the farmland (refer to annexures). Questionnaires were issued in both English and Afrikaans (the predominant languages used by farmers in the district) and were randomly distributed

Table 3.6 Number of game farms registered for export

Municipality	Town/Area	No. of Farms Registered
LETSEMENG	Jacobsdal	7
	Koffiefontein	13
	Luckhoff	33
	Petrusburg	21
	Subtotal	74
KOPANONG	Bethulie	28
	Edenburg	24
	Fauresmith	20
	Jagersfontein	18
	Philippolis	17
	Reddersburg	18
	Springfontein	8
	Trompsburg	30
	Subtotal	163
MOHOKARE	Rouxville	5
	Smithfield	9
	Zastron	2
	Subtotal	16
XHARIEP DISTRICT TOTAL		**253**

Source: FSDA (2010)

amongst the farmers in the Xhariep district of the Free State. As no reliable list of all farmers in the Xhariep district was available from the Free State Department of Agriculture, the Department of Environmental Affairs or Veterinary Services, a list of farms from the Free State provincial deeds office was used. A random sample of farmers was selected with the assistance of the Department of Biostatistics of the University of the Free State. A total of 1 571 questionnaires were sent out to farmers in the Xhariep district of the Free State Province. Of these, 174 questionnaires were returned by the post office, marked as undelivered, culminating in 1 397 questionnaires that were effectively distributed. After following up telephonically in an attempt to increase the response rate, a total of 200 (14.32%) questionnaires were returned for coding and statistical analysis. Of the 200 questionnaires returned, 15 respondents indicated that their farms had been sold and that they were therefore unable to supply any data. The data from the remaining 185 questionnaires was utilised and statistically analysed with the assistance of the Department of Biostatistics of the University of the Free State.

3.3 RESULTS AND DISCUSSION

The survey covered a total of 587 057 hectares of farmland being managed by the respondents, representing 23.48% of the 2.5 million hectares classified as natural grazing in the district. Table 3.7 indicates the number of respondents with or without game and with extra land for the keeping of game. Of the 185 respondents, 56 (30.27%) indicated that they were not keeping any wild game on their farms and that they were not interested in doing so, whilst 6 (3.25%) respondents indicated that they were not keeping wild game on their farms, but that they were interested in doing so and had land available for this purpose. A total of 123 (66.48%) respondents indicated that they did have wild game on their farms, while 40 (21.62%) still had extra land available for keeping game and 83 (44.86%) had no additional land available for this purpose. It was concluded that 129 (69.73%) of the total respondents either had game

Table 3.7 Respondents with or without game and extra land for keeping game

Respondents (n=185)	Frequency respondents	Percentage respondents	Land with game (ha)	Additional land for game (ha)
Without game; without extra land available	56	30.27	-	-
Without game; with extra land available	6	3.25	-	6306
With game; with extra land available	40	21.62	123205	48127
With game; without extra land available	83	44.86	26688	-
Total	**185**	**100**	**149893**	**54433**

and/or had land available for game farming. The total area of additional land owned by the respondents who were keeping game on their farms was 48 127 hectares (Table 3.7). In addition, six (3.24%) of the 185 respondents indicated that they were not presently keeping game on their farms, but they did have land available and were interested in doing so. These 6 portions of land comprise a total area of 6 306 hectares, which brings the total area of land potentially available for game farming to 54 433 hectares.

In summary, therefore, of the 185 randomly selected respondents from the Xhariep district, 30.27% were not farming with game and were not interested in extending their farming activities to include game production, whilst the remaining 69.73% were either keeping game on their farms and had extra land available for game production, or were not keeping game but were interested in game production and had extra land available for game farming.

Extent of game farming: The extent of game farming in the three municipal areas, as revealed by the 123 respondents who were keeping game on their farms, is indicated in Table 3.8. All together, the respondents who were keeping game owned a total of 525 415 hectares of farmland in the area of the district covered by the survey. Table 3.8 also shows that a total of 30 868 head of game were roaming on 149 893 hectares of this farmland, with an additional 48 127 hectares of land available for game production. The size of the farms utilised for game farming ranged between 350 and 23 000 hectares, with a median size of 1 800 hectares. Twenty-six (21.14%) of the respondents had farmland smaller than 1 000 hectares available for game. Of these farms, the area of land utilised for game ranged between 10 and 23 000 hectares, with a median size of 500 hectares. Forty-six of the original 185 respondents indicated that they had additional land available for game farming, ranging between 50 and 6 500 hectares each, totalling 54 433 hectares of land overall. Thirty (65.2%) of these respondents had ≥1 000 hectares of extra land available for game farming, while 16 (34.8%) had ≥1 000 hectares available for this purpose.

Table 3.8 Extent of game farming per district municipal area in the Xhariep district

District municipal area	Number of game	Land with game (ha)	Total farm size (ha)	Extra land available for game (ha)
Letsemeng	3 304	17 365	40 893	3 200
Kopanong	21 762	110 394	406 161	32 681
Mohakare	5 802	22 134	78 371	12 246
TOTAL	**30 868**	**149 893**	**525 425**	**48 127**

The 30 573 head of game reported by the respondents in the survey area comprised a number of different species, as presented in Table 3.9. The number of game on farms ranged between five and 5 064 head of game with a median of 107 per respondent. Sixty respondents (48.48%) had ≥ 100 head of game on their farms. Table 3.9 further shows that springbuck comprised 43.04% of the total number of game found on the farms included in the survey, followed by blesbuck (15.81%) and mountain reedbuck (10.66%). Conroy and Gaigher (1982) found springbuck to be the most common game species ranched in South Africa, followed by eland, blesbuck, impala and kudu. Of these, springbuck is the most favoured species to farm, followed by impala, kudu and blesbuck (Jansen van Rensburg, 1992). Jansen van Rensburg (1992) concluded that springbuck is the game species cropped most extensively in South Africa – a finding confirmed by the SAOBC (2009) in their statement that springbuck constitutes 60% of all species cropped in South Africa. These observations are reflected in the South African export figures released by the SAOBC.

Farming activities: Of the total respondents, 178 (96.22%) were practising commercial farming on commercial land, while seven (3.78%) were farming on land located in a conservancy area. Of the commercial farming respondents, 94.07% were practising mixed farming and not utilising the land exclusively for game farming. This practice places wild game at risk, as the animals may have access to feed supplements and pesticides used for domesticated farm animals, thus leaving residues in their meat. Producers interested in utilising the export market must be able to prove that they have adequate control measures in place to ensure that their products are free from hazardous residues (RSA, 2010).

Feed supplements: Seventy-five (62.5%) of the 120 respondents who commented on the question in this regard indicated that they were not making use of any feed supplements. The remaining 45 (37.5%) respondents indicated that they were making use of supplements, but natural products only (Table 3.10). This table also shows that

Table 3.9 Number of game on farms reported by respondents in the Xhariep district

Species	Frequency	Percentage
African elephant *(Loxodonta Africana)*	0	0.00
Hippopotamus *(Hippopotamus amphibious)*	0	0.00
Giraffe *(Giraffa camelopardalis)*	5	0.02
Buffalo *(Syncerus caffer)*	94	0.30
Eland *(Taurotragus oryx)*	615	2.01
Kudu *(Tragelaphus strepsiceros)*	543	1.78
Blue wildebeest *(Connochaetes taurinus)* Black wildebeest *(Connochaetes gnou)*	1 349	4.41
Waterbuck *(Kobus ellipsiprymnus)*	45	0.15
Gemsbuck *(Oryx gazella)*	963	3.15
Red hartebeest *(Alcelaphus buselaphus caama)*	851	2.78
Tsessebe *(Damaliscus lunatis)*	11	0.04
Plains zebra *(Equus quagga)*	256	0.84
Mountain zebra *(Equus zebra)*	121	0.40
Impala *(Aepyceros melampus)*	1 420	4.64
Springbuck *(Antidorcas marsupialus)*	13 160	43.04
Southern reedbuck *(Redunca arundinum)*	48	0.16
Mountain reedbuck *(Redunca fulvorufula)*	3 258	10.66
Vaal rhebuck *(Pelea capreolus)*	371	1.21
Blesbuck *(Damaliscus pygargus phillipsi)*	4 837	15.81
Bontebok *(Damaliscus pygargus dorcas)*	30	0.10
Nyala *(Tragelaphus angasii)*	0	0.00
Bushbuck *(Tragelaphus scriptus)*	17	0.06
Bushpig *(Potamochoerus porcus)*	0	0.00
Warthog *(Phacochoerus aethiopicus)*	418	1.37
Fallow deer *(Cervus dama)*	33	0.11
Lechwe *(Kobus leche)*	85	0.28
Steenbuck *(Raphicerus campestris)*	1 253	4.10
Ostrich *(Struthio camelus)*	743	2.43
Other	46	0.15
Total	**30 572**	**100.00**

Table 3.10 Use of feed supplements by game farmers in the Xhariep district

Supplement	**Yes (%)**	**No (%)**
Feed licks (n=120)	45 (37.5%)	75 (62.5%)
Name of supplement (n=41)	**Frequency**	**Percentage**
Salt lick	16	39.02
Salt, phosphate, sulphur	4	9.76
Game block	10	24.39
NUTRITub	5	12.20
Winter lick	2	4.88
Super 18, maize meal	1	2.44
Rumervite, Voermol, Stormberg	3	7.32
Supplier of supplement (n=19)		
Own mix	6	31.58
North-west Co-operative	1	5.26
Strormberg Feeds, Molteno	3	15.79
Voermol	3	15.79
NUTRI	1	5.26
Senwes	3	5.26
Rumervite, Voermol, Stormberg	1	5.26
Venter Farming	1	5.26

the majority of the farmers (6 or 31.59%) were mixing their own supplements, whilst the remainder were purchasing registered products from businesses supplying products of which the contents are known. This indicates that none of the respondents should encounter problems in registering their farms for the export trade and that they are all suitable candidates for harvesting game for the export market and for the control of game numbers on their farms.

Pesticides: Of the 113 respondents who commented on the question in this regard, 106 (93.81%) indicated that they were not making use of any pesticides, whilst seven (6.19%) indicated the contrary. Table 3.11 shows that of the seven respondents who were making use of pesticides, three were using the product *Deadline*, which is a pour-on pesticide that is manufactured and sold by the company Bayer. One of the respondents indicated that he was using paraffin on the salt licks, while another three were using aloe powder as a pesticide.

Utilisation of game: The utilisation of game and strategies to control game numbers is presented in Table 3.12. Game producers were utilising various methods to market their game in order to control their numbers. The most preferred method of controlling game numbers was sport hunting, with 69.11% of respondents making use of this method to some extent. Biltong hunting, at 44.72%, was the second most popular method, followed by the harvesting of game for export purposes at 23.58%. Other respondents identified live sales (16.26%), trophy hunting (12.20%), and safari hunting in combination with other methods (11.38%).

Export game harvesting as a game utilisation method: The reasons given by respondents for not utilising game harvesting for export as a market option are set out in Table 3.13. Of the 43 respondents who were utilising game harvesting, 88.72% expressed the opinion that the abattoirs were located too far from the harvesting area, while of the 44 respondents who commented on costs, 81.82% expressed the opinion

Table 3.11 Use of pesticides by game farmers in the Xhariep district

Pesticides	**Yes (%)**	**No (%)**
Use of pesticides (n=113)	7 (6.19%)	106 (93.81%)
Name of pesticide (n=7)	**Frequency**	**Percentage**
Deadline	3	
Aloe powder	3	
Paraffin on salt licks	1	
Supplier of pesticide (n=2)		
Bayer	2	

Table 3.12 Utilisation of game by game farmers in the Xhariep district

Utilisation of game n=123	Frequency	Percentage
Live sales		
Sell 70 – 99% live	4	3.25
Sell 50% or less live	16	13.01
Sell no live game	103	83.74
Game harvesting		
Harvest 51 – 100% for export	17	13.82
Harvest 50% or less for export	12	9.76
Harvest no game for export	94	76.42
Biltong hunting		
Harvest 51 – 100% through biltong hunting	18	14.64
Harvest 50% or less through biltong hunting	37	30.08
Harvest no game through biltong hunting	68	55.28
Trophy hunting		
Harvest 50% or less through trophy hunting	15	12.20
Harvest no game through trophy hunting	108	87.80
Safari hunting		
Harvest 51 – 80% through safari hunting	1	0.81
Harvest 50% or less through safari hunting	13	10.57
Harvest no game through safari hunting	109	88.62
Sport hunting		
Harvest 51 – 100% through sport hunting	47	38.22
Harvest 50% or less through sport hunting	38	30.89
Harvest no game through sport hunting	38	30.89

Table 3.13 Reasons for not utilising game harvesting for the export market as a method of marketing game

Reason	**Frequency (Percentage)**
Abattoirs located too far (n=43)	36 (88.72)
Prices not sufficiently competitive (n=44)	36 (81.82)
Other reasons (n=32)	
Not interested – too little game – private use – roaming animals	30 (93.75)
Poor shooting by hunters (harvesters)	1 (3.13)
Unreliable payment	1 (3.13)

that the prices for wild game meat were not sufficiently competitive. Of the remaining 32 respondents, 93.75% indicated that they had too few roaming game to utilise this method, while 3.13% expressed the opinion that the hunters on the harvesting teams were not skilled at shooting. A further 3.13% felt that payment from the harvesting teams was unreliable.

Utilisation of provincial game meat export facilities: Table 3.14 presents the data gathered from the question about whether the game producers taking part in the survey would be willing to change their game utilisation methods and marketing strategy should the Free State have its own provincial game meat export facility. Of those who responded to this question, 68.52% indicated that they would be willing to change their marketing strategy to include game harvesting for export should the Free State have its own game meat export facility. Of the 31.48% of respondents who indicated that they would not be willing to make such a change, the majority (90.63%) motivated their response by stating that they envisaged marketing difficulties between South Africa and the EU, while 4.76% were of the opinion they had too few head of game and a further 4.76% felt that the cost of the fencing that might be required would be too high.

3.4 CONCLUSION

Despite efforts to enhance local economic development through governmental agricultural projects in an attempt to improve food security and alleviate the extreme poverty in the Xhariep district of the Free State, this area remains under considerable economic pressure. Nearly one-third (28.9%) of the population is unemployed, while 90% earn less than R1 000 per month. The situation is unbearable, especially in light of the fact that a large proportion of the population is dependent on agriculture, which is under extreme economic pressure for a number of reasons, including drought and other natural disasters such as seasonal flooding. A further decline in agriculture would have an extremely negative effect on employment, resulting in even higher levels of poverty.

Table 3.14 Changes in marketing strategy should the Free State have its own provincial game meat export facility

Change in marketing strategy	**Yes** **Frequency (Percentage)**	**No** **Frequency (Percentage)**
Change of marketing to harvesting for export (n=108)	74 (68.52)	34 (31.48)
If no, other reasons (n=21)		
Foresee marketing problems in EU	19 (90.47)	
Game numbers too small	1 (4.76)	
Cost of possible fencing too high	1 (4.76)	

Against this backdrop, a survey was conducted to cast light on wild game production and utilisation in the district as a possible agricultural enterprise that could be extended via the use of existing resources in order to establish a more sustainable industry that could benefit the district through the creation of both direct and indirect job opportunities. The literature review has shown that the local authorities are relatively wealthy in terms of ownership of land and water, which is in ample supply from the Gariep River forming the southern border of the district. The Xhariep district is part of an area that boasts a sound infrastructure, with seventeen towns, good roads and three national roads passing through the district. This is an indication that the district possesses the necessary resources and infrastructure to adequately service any suitable industry to the benefit of the district. The results revealed that 86% (2.5 million hectares) of the district is comprised of agricultural land that has adequate natural grazing. Although sheep farming is the predominant farming activity, there is an abundance of game in the district, as determined from the number of game roaming the farms owned by the survey respondents. This is supported by the fact that, of all the wild game harvested for the export market in the Free State, nearly 50% was harvested in the Xhariep district. This figure is significant considering the fact that 94% of the respondents indicated that they were presently not making use of game harvesting for the export market as a method of marketing their game.

There is significant potential for the expansion of the game industry, as several respondents indicated that they were interested in expanding their game production and that they had land available for this purpose. From the survey it can be deduced that game production in the area covered by the survey can be increased by at least one-third of the existing numbers. The survey furthermore revealed that the majority of respondents were not making use of food additives or pesticides that could leave chemical residues in game meat; that nearly one-quarter of the respondents keeping game had already utilised game harvesting for the export market in combination with other means as a method of controlling game numbers, and that several respondents would be willing to change their current marketing strategies to include this method of

controlling game numbers. The establishment of a wild game export facility in the district appears feasible – supported by the fact that such a project was favoured by nearly 70% of the respondents.

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Chapter 4

THE UTILISATION OF FLANKING SLAUGHTER FACILITIES FOR GAME MEAT PRODUCTION AND EXPORT PROCESSING IN THE XHARIEP DISTRICT

This chapter has been submitted, partially or in full, for publication in *Meat Science* (Elsevier, ISSN 0309-1740).

ABSTRACT

The Free State Province has high-throughput abattoirs that are mostly underutilised, raising questions about whether these facilities could be utilised for the processing of wild game meat for international markets and, if so, what adaptations would be required should they qualify. The aim was firstly, to assess the high-throughput abattoirs in the Free State via the existing hygiene assessment system (HAS), and secondly to utilise the results in the adaptation of the HAS into a tailor-made matrix put forward as a mechanism to evaluate the potential of facilities to be converted into and/or developed as game meat processing facilities. Twenty-one high-throughput abattoirs in the Free State were audited by nine provincial inspectors trained as food safety auditors, who rotated to make up teams of two that audited each facility twice. The mean results of the two audits were then further analysed utilising the novel evaluation matrix to measure the readiness and development potential of existing abattoirs towards qualifying as export game abattoirs and game meat processing facilities. Only abattoirs with final weighted and category scores of 60 and above were considered for this purpose and subjected to a novel matrix in order to ascertain their potential to be adapted. All category scores on the new matrix amount to 100 and measure the level of compliance with each category, and they are then weighed against the level of compliance with specific categories. The scores are multiplied by the weighted scores for each subdivision, and the weighted scores are then totalled, adding up to an overall score out of 100, which is the total score of the specific abattoir. There were no significant differences in the matrix scoring between individual species or between single- and multi-species abattoirs, indicating that the hygiene management of facilities are not related to the species being handled. Normal distribution results were obtained from the scores in individual categories. The impact of ownership on the scores clearly emerged, as abattoirs with scores below 60 were managed by single owners, whilst abattoirs with scores above 70 were managed by specialist teams, whether as companies or as families. The value of this novel developmental potential evaluation matrix is that it can be used in the international abattoir industry and is not

species specific. Existing knowledge and resources can be utilised, and this developmental direction may be successfully explored without considerable capital layout in view of the establishment of a new dedicated wild game meat exporting facility in the Free State.

4.1 INTRODUCTION

Apart from the Northern and Eastern Cape provinces, the Free State is the largest producer of wild game in South Africa (SAOBC, 2009). Game exporting establishments and processing facilities are predominantly situated in the Western Cape and Eastern Cape provinces, which results in the Free State experiencing an outflow of revenue from game carcasses for meat production and export, as well as the loss of valuable opportunities for employment and the generation of much-needed foreign currency in this area. Although there are 21 existing high-throughput red meat abattoirs in the Free State, the majority of these are underutilised, which poses the question of whether these abattoirs can be used for the dressing and processing of game meat. If not, a second question arises as to what is required of such establishments to be able to process wild game meat. If existing abattoirs can be adapted to process game meat, consideration must be given to the adaptations needed in order to meet European Union (EU) requirements.

A prerequisite for South African abattoirs to apply for registration in order to export their products is that they must comply structurally with "high-throughput" requirements as determined by the Meat Safety Act, Act 40 of 2000, and must be managed in accordance with a prescribed hygiene management and evaluation system. Section 11(1)(e) of the South African Meat Safety Act, Act 40 of 2000 (RSA 2000), under the heading "Essential National Standards", requires that all abattoirs be managed in accordance with the prescribed hygiene management and evaluation system, whilst the Red Meat Regulations promulgated in terms of regulation 49(e) of the Meat Safety Act require that the hygiene status of an abattoir be determined by means of the Hygiene Assessment System (HAS). In order for the HAS audits to be trustworthy and scientific, they must be performed according to internationally accepted auditing principles. An audit, with specific reference to a HAS audit, is defined by the International Standards Organisation (ISO), as per standard 19011 (ISO, 2002), as a systematic, independent and documented process for obtaining audit

evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled. In addition to the HAS a number of national activities directed the implementation of the system. Under instruction of the national Intergovernmental Technical Committee for Agriculture (ITCA) Veterinary Working Group, a secondary task group known as the National Abattoir Rating Working Group was instituted to establish a National Abattoir Rating Scheme as provided for by the Meat Safety Act (Act 40 of 2000). One of the tasks of the latter working group was to develop standard operating procedures (SOPs) for the uniform application of the HAS system throughout all abattoirs in South Africa. The standardisation of the HAS application entailed consistency of evaluation and scoring and the formulation of non-conformances.

Hygiene assessment system (HAS): HAS is a quantitative assessment of an abattoir's hygiene status through the use of a compliance audit checklist in order to ascertain the extent to which an abattoir complies with the requirements set by the Meat Safety Act and Regulations. However, it does not only consider the hygiene and hygienic practices within a facility, but takes a holistic view of all aspects that can have an influence on the safety of the products. Therefore all hazards (physical, chemical and biological) as well as quality and managerial aspects, are considered in such evaluations. The HAS form or checklist is designed for specific categories of abattoirs and divides abattoir functions into ten specific categories (see Annexure C). These are: 1) ante-mortem; 2) slaughtering and dressing; 3) meat inspection and marking; 4) chilling and dispatch; 5) offal processing; 6) sanitation and pest control; 7) personnel; 8) general conditions; 9) structure and maintenance; and 10) hygiene management systems. These ten categories are subdivided into specific topics within each division, each of which has an allocated score. All subdivisions add up to a total category score of 100 points while each of the 10 categories in turn has a weighted score. The weighted scores are fixed and are allocated according to the influence of a specific category on the overall safety of the product being produced. Categories such as slaughtering and dressing, meat inspection, and chilling and dispatch therefore have the highest weighted scores, whilst

structure and maintenance and personnel carry less weight because of their lesser influence on the safety of the final product.

In order to limit subjectivity, the HAS audits must be performed by trained and competent officials who have received training with regard to the allocation of scores. Scores are allocated according to the conditions prevailing on the day of the audit, with historical conditions not being taken into account. The severity of non-conformances should not be considered when scoring, since the HAS document already compensates for this via the weighting of scores. It must be kept in mind that the HAS document is merely a checklist and that the audits are performed according to the audit criteria, which are the provisions of the Meat Safety Act and the Red Meat Regulations. The points mentioned in the document are therefore used as guidelines on what is to be audited and should not be the only aspects considered. Any non-conformances observed are noted on the HAS document, and the reason/s for not allocating a perfect score are explained in the comments section provided on the HAS checklist. On completion of all 10 categories of the HAS document, any non-conformances found are carried over to the Non-conformance, Corrective Action and Clearance Report and the final scores of each section are transferred to a HAS score sheet (Annexure C).

Non-conformance, corrective action and clearance report: On the Non-conformance, Corrective Action and Clearance Report, mention is made of each category/division of the HAS to which reference is made, and the non-conformances found (findings) are listed in a specific division, together with references to the relevant section in the act or regulation that was transgressed. All mentioned non-conformances must consequently be prioritised as major, minor or critical. For prioritisation, a "critical" non-conformance is defined as one that will directly influence the safety of the product and which therefore poses an imminent risk to public health. A "major" non-conformance is defined as one with a high potential to directly influence the safety of the product and where the potential impact is likely to compromise food safety if no remedial action is taken. A "minor" non-conformance is noted when the potential impact of the non-

conformance is not likely to pose a serious or imminent risk to the safety of the product. However, if a number of minor non-conformances are considered collectively and are likely to compromise food safety, the non-conformances are reclassified as "major" or "critical". All non-conformances prioritised as "critical" or "major" are listed as non-conformances on the prescribed Non-conformance, Corrective Action and Clearance Report. This report must be presented to the owner/hygiene manager of the facility where the corrective actions to be taken to prevent recurrence are listed, and a proposed date of completion must be agreed on. The HAS is only completed once the corrective actions have been addressed and the form is signed off by the registered inspector. The scores out of 100 for each division are carried over to the HAS score sheet and multiplied by the weights of each subdivision. The weighted scores are then added up and totalled as an overall score out of 100, which is the total score for the abattoir. The score reflects the likelihood of safe meat being produced in that specific abattoir based on the HAS audit – therefore the higher the score out of 100, the lower the risk.

Therefore, this study was prompted by a reflection on the questions raised, together with the realisation that, despite all the game meat being produced in the Free State, the real wealth associated with wild game harvesting is being generated by other provinces from where the products are being exported. Producers of game in the Free State are being paid local prices for their game meat, while foreign currency is being earned by other provinces where the meat is processed and marketed internationally. By optimising the resources within the Free State, jobs can be created and wealth can be generated (both directly and indirectly) to the benefit of the citizens of the Free State. The aims of this study were therefore firstly to assess the high-throughput abattoirs in the Free State via the existing HAS evaluation system, and secondly to utilise the results in the adaptation of the HAS system into a tailor-made matrix put forward as a mechanism to evaluate the potential of facilities to be converted into and/or developed as game meat processing facilities.

4.2 MATERIALS AND METHODS

Twenty-one high-throughput abattoirs that are spread over the five districts of the Free State were audited during a period of six months between March and August 2010. Provincial inspectors were trained in auditing according to the International Standards Organisation (ISO) standard 19011 and in the application of the HAS according to Standard Operational Procedures (SOP) to ensure uniformity in their scoring methods and to standardise the application of the audits. The scope of the audits was from the point of receiving the livestock to the dispatch of carcasses at all high-throughput abattoirs in the Free State. The criteria used were the Meat Safety Act of 2000 (RSA, 2000) and the Red Meat Regulations (RSA, 2004) as promulgated under the Act. In order to ensure objectivity, nine auditors rotated to make up teams of two, which audited each facility twice, thus ensuring that no abattoir was audited by the same team. The mean scores of the two audits at each abattoir were used to generate a final HAS score. Calibrated instruments were used. Abattoir owners were notified in advance of the date of the intended audit, and during the opening meeting they or their representatives and hygiene managers were invited to observe the auditing process. The HAS document (Anexure C) dated 1 April 2009 was used for all audits.

For evaluation purposes, a weighted and category-minimum score of 60, which is regarded as the separation between poor and fair according to the HAS, was used. The mean results of the two audits conducted were tabulated and further analysed. Only final weighted and category scores of 60 and above were thus further analysed. As the HAS is the only nationally accepted scientific measure of the effectiveness of an abattoir's hygiene management, the weighted scores can be interpreted as a measure of the potential risk to public health of products derived from a specific abattoir. Since this method measures the potential risk to the product by measuring compliance to South African meat safety legislation, it was necessary to establish an additional evaluation matrix to measure the readiness and development potential of existing abattoirs towards qualifying as export game abattoirs and game meat processing

facilities. This novel matrix was required to objectively measure and rate the qualifying abattoir's potential for being successfully adapted for this purpose.

Development of a novel evaluation matrix: For the development of the matrix, the HAS checklist was again scrutinised for categories that are necessary for red meat abattoirs, but which do not necessarily impact on game meat. The only two categories that could possibly be considered as playing a lesser role in the utilisation of an abattoir as a game meat export facility were the ante-mortem and the offal-processing categories. Ante-mortem falls into this category, as the ante-mortem inspection of wild game takes place before harvesting and not at the abattoir, while offal processing is included because the removal and inspection thereof mostly take place during harvesting and not during processing at the abattoir, as is the case with red meat processing. However, as the culling of wild game is seasonal and most of the export abattoirs slaughter other red meat species as well, the mentioned categories play an important role in the hygiene management of abattoirs. As the aforementioned two categories were already assigned lower weights for the calculation of the weighted scores in the existing HAS audit checklist, a decision was made to utilise the weighted HAS scores as originally reported in the HAS audit results as a category component in the novel evaluation matrix.

All category scores on the matrix amounted to 100, which measure the level of compliance with each category, and the scores were then weighted against the level of compliance with the specific categories (Table 4.1). The scores were multiplied by the weights scored for each subdivision and the weighted scores were then totalled, adding up to an overall score out of 100, which is the total score of the specific abattoir. The score reflects the abattoir's potential to be successfully adapted as a wild game meat export facility. The mean total weighted HAS scores of the audited abattoirs were adapted to constitute 50% of the suggested evaluation matrix score, as can be noted in Category A of Table 4.1. Category B, which is weighted as 20% in the new matrix, measures the additional structural requirements needed at existing abattoirs in order to

process wild game meat. A number of factors unique to the handling of game carcasses were taken into consideration in the qualification of the abattoirs surveyed. For example, as game is harvested in the veld and partially dressed at wild game meat depots, only the partially dressed game carcasses are transported in chiller trucks to the abattoirs. On arrival these trucks need to be offloaded into a receiving chiller room from where the carcasses are processed further, hence the need for a reception chiller room for the reception of partially dressed game carcasses at proposed game abattoirs. Furthermore, only deboned meat (bone out) is suitable for export purposes, which reiterates the need for a deboning room. Other considerations evaluated in this section are facilities for further cutting, processing, handling of bones, storing of boxes and spices, labelling, and separate ablution facilities, as well as the dimensions of the existing premises for possible extensions, plus a suitable and adequate water supply. Finally, the financial impact of compliance is an important consideration, as not all the qualifying abattoirs have the same level of compliance. Category C (Table 4.1) measures veterinary involvement at the abattoir being evaluated, because in order to export wild game meat, a veterinarian is expected to be present at the facility at all times during production in order to supervise all aspects of meat hygiene and to take responsibility for the necessary documentation and final certification of the product to be exported. This category is weighted at 15%, scored by taking into account veterinary involvement (full-time, part-time, *ad hoc* or no involvement). Finally, Category D measures the abattoir's location and accessibility to relevant services, which is also weighted at 15% and scored by evaluating the locality of the abattoir and its accessibility in relation to the primary production area, airports for the dispatching of final products, laboratory services, back-up meat inspection services, and maintenance services. It also evaluates whether the increased waste generation and effluent could be accommodated by the existing systems and municipal infrastructure.

Table 4.1 Proposed matrix for measuring the development potential of abattoirs to be adapted for game meat export

Categories	Category Score (100)	Weight	Weighted Score
A. Hygiene Assessment System (HAS) Score		0.50	
B. Additional Structural Requirements		0.20	
C. Veterinary Involvement		0.15	
D. Accessibility of Services		0.15	
FINAL SCORE			

4.3 RESULTS AND DISCUSSION

The results of the audits performed at the 21 high-throughput abattoirs in the Free State are reflected in Table 4.2. The abattoirs were randomly assigned numbers between 1 and 21 in order to retain anonymity. The mean weighted score of the audited abattoirs in the Free State is 63.8, which according to the HAS is categorised as good (Annexure C). Furthermore, the mean scores of the individual categories, which range between 58.5 and 72.4, indicates that all categories with the exception of "general conditions", which refers to the premises (access control, effluent, water, waste management, etc.) achieved results categorised as good with scores above 60. Abattoirs 12, 16, 17 and 20 were single-species abattoirs, with abattoirs 12 and 17 handling pork and abattoirs 16 and 20 processing mutton exclusively. No significant difference in the scoring was found between individual species or between single- and multi-species abattoirs, indicating that the hygiene management of facilities is not related to the species being handled. An investigation into the individual category scores, which ranged between 36 and 96 for A: ante-mortem, 45 and 87 for B: slaughtering and dressing; 44 and 86 for C: meat inspection and marking, 43 and 96 for D: chilling and dispatch, 31 and 91 for E: offal processing, 24 and 92 for F: sanitation and pest control, 28 and 88 for G: personnel, 30 and 92 for H: general conditions, 35 and 92 for I: structural requirements, and 37 and 93 for J: hygiene management systems. Further investigation into the final weighted scores clearly revealed the impact of the ownership of abattoirs on the scores. All abattoirs with scores below sixty are establishments with a single owner, whilst all abattoirs with scores above 70 are managed by a team, whether as companies or families. This can be attributed to the specialisation of functions in the larger company-operated abattoirs. There are technical, financial and marketing specialists in these abattoirs where tasks are designated to specialised teams accountable to management. A single-owner abattoir, where the owner is often manager, marketer and technician, often requires the owner to divide his/her time to the detriment of the technical aspect as marketing and general management are prioritised. The results were analysed for the purpose of selecting abattoirs that could qualify to be

Table 4.2 Mean scores of audits performed at high-throughput abattoirs in the Free State

Categories* Abattoirs	A	B	C	D	E	F	G	H	I	J	Weigh -ted Score
1	71	66	72	75	60	62	67	77	70	70	70
2	63	70	**48**	**51**	91	60	60	60	61	71	60
3	67	**50**	65	68	80	**27**	**36**	60	62	**44**	**55**
4	74	74	71	68	73	86	60	92	**58**	63	72
5	61	**49**	**55**	**51**	70	**28**	**39**	**30**	**44**	**37**	**45**
6	**48**	**53**	**44**	**43**	**31**	**31**	**45**	**38**	**48**	**47**	**46**
7	65	64	70	90	89	81	79	87	74	75	78
8	96	75	74	75	66	81	71	75	68	90	77
9	78	73	61	72	90	70	**46**	79	**53**	83	69
10	**55**	60	**54**	65	82	**49**	**50**	**43**	**53**	**43**	**55**
11	**40**	**53**	**52**	67	63	**59**	**50**	61	**51**	**46**	**55**
12	64	74	65	89	75	**59**	**52**	**52**	73	**53**	67
13	**55**	**51**	68	75	76	**47**	**39**	**53**	**43**	**47**	**55**
14	70	**52**	63	77	77	78	74	64	66	**58**	67
15	88	87	86	91	82	84	88	91	76	93	87
16	88	84	86	95	84	92	84	90	92	85	87
17	75	67	64	75	70	64	64	69	**58**	**56**	67
18	**59**	**54**	61	71	60	60	**59**	79	**54**	**58**	**55**
19	**36**	**45**	**46**	**52**	**55**	**24**	**28**	**34**	**35**	**50**	**39**
20	**54**	60	69	75	**56**	**48**	58	70	69	**43**	62
21	77	67	62	95	62	77	80	77	65	68	73
Means	65.9	63.2	63.6	72.4	70.9	60.3	58.5	65.8	60.6	63.9	63.8

* The various categories audited are indicated as: A: Ante-mortem, B: Slaughtering and dressing, C: Meat inspection and marking, D: Chilling and dispatch, E: Offal processing, F: Sanitation and pest control, G: Personnel, H: General conditions, I: Structural requirements, and J: Hygiene management systems, whilst the numbers in the first column reflect the various abattoirs evaluated (21 in total).

measured against the novel evaluation matrix. From the HAS weighted scores reflected in Table 4.2, 8 abattoirs did not receive the minimum weighted score of 60 and were discarded for the purpose of further evaluation. 13 (61.9%) of the original 21 abattoirs that were evaluated achieved a weighted score above 60 out of 100. Further measurement of these abattoirs against the results of their individual category scores eliminated a further 7 which left 6 (28.6%) of the original 21 abattoirs eligible for consideration for further evaluation in order to ascertain which would be most suited to being adapted as facilities for the slaughtering and processing of wild game meat for export. The weighted scores of these six abattoirs ranged between 70 and 87 – a good to excellent rating according to the HAS rating matrix. The qualifying abattoirs are listed as numbers 1, 7, 8, 15, 16 and 21 (Table 4.2). These qualifying abattoirs were further tested by utilising the newly developed matrix, the results of which are reflected in Table 4.3. In order to demonstrate the test, the names of the towns in with these six identified abattoirs are located can be revealed as: Bloemfontein (8), Frankfort (7), Harrismith (1), Sasolburg (16 and 21) and Welkom (15). Category A's score is fixed, as it was determined by the HAS score of the abattoir obtained by the audit performed and reflected in Table 4.2. Category B: Additional structural requirements was determined by the existing structures on the premises, and although all abattoirs must install reception chillers to receive the harvested game carcasses, abattoirs such as number 15 already have a fully operational deboning facility and chillers for the handling of boxed material, whilst the remaining abattoirs demonstrated varying levels of compliance as far as the requirements for the handling of game for the export market are concerned. This same principal applies to the other categories, where abattoir number 15 has a full-time veterinarian on the premises and a fully independent meat inspection service, while others at varying levels of compliance have *ad hoc* or no veterinary involvement and/or independent meat inspection (Table 4.3). The same criteria apply to category D, where abattoirs such as number 8 are situated in a city with an airport and accessibility to laboratories and the distance to the production area was taken into account, while others such as number 1 are situated in a rural environment, although not completely isolated but further away from services and back-up personnel.

Table 4.3 Testing the matrix: Scoring qualifying abattoirs to measure their ability to be adapted into export game meat facilities

Categories* Qualifying Abattoirs		A	B	C	D	Total weighted score
1	Score	70.00	40.00	60.00	50.00	
	Weight	0.50	0.25	0.10	0.15	
	Weighted score	35.00	10.00	6.00	7.50	**58.50**
7	Score	78.00	40.00	60.00	60.00	
	Weight	0.50	0.25	0.10	0.15	
	Weighted score	39.00	10.00	6.00	9.00	**64.00**
8	Score	77.00	60.00	80.00	90.00	
	Weight	0.50	0.25	0.10	0.15	
	Weighted score	38.50	15.00	8.00	13.50	**75.00**
15	Score	87.00	70.00	90.00	80.00	
	Weight	0.50	0.25	0.10	0.15	
	Weighted score	43.50	17.50	9.00	12.00	**82.00**
16	Score	87.00	50.00	70.00	70.00	
	Weight	0.50	0.25	0.10	0.15	
	Weighted score	43.50	12.50	7.00	10.50	**73.50**
21	Score	73.00	50.00	70.00	70.00	
	Weight	0.50	0.25	0.10	0.15	
	Weighted score	36.50	12.50	7.00	10.50	**66.50**

* The categories evaluated are indicated as: A: Hygiene Assessment System (HAS), B: Additional structural requirements and financial implications, C: Veterinary involvement, and D: Accessibility of services.

The value of this novel developmental potential evaluation matrix is that it can be applied to the abattoir industry internationally and is not species specific. It should, however, be applied objectively by knowledgeable operators in the industry. As 50% of the matrix represent the management ability as determined by HAS audits is fixed, the remaining categories can be adjusted according to the needs of a specific industry by changing the categories and allocating weights to each category in relation to the influence that might be exerted on the final goal. The final results indicating the potential of the abattoirs most likely to be successfully adapted into wild game meat export facilities in the Free State are presented in Figure 4.1. This figure gives a visual representation of the fact that after a thorough investigation into the hygiene status, management ability, structural requirements, locality and availability of services of high-throughput abattoirs in the Free State, abattoir number 15 (situated in the city of Welkom) was identified as the most likely to be successfully transformed into a wild game meat exporting facility, followed by abattoirs number 8 (situated in Bloemfontein), 16 and 21 (situated in Sasolburg), and 7 and 1 (situated in Frankfort and Harrismith respectively).

4.4 CONCLUSION

The results of the HAS survey demonstrated that although high-throughput abattoirs in the Free State have hygiene management systems in place and are striving towards compliance with hygiene standards, the majority are not at a level to enter the international market yet. Six abattoirs however demonstrated their ability to manage the hygiene of their establishments with ratings of good to excellent. This demonstrates that there are business operators in the meat industry in the Free State with ample knowledge and ability to successfully process meat products and that they would qualify to enter into the wild game meat export market through the optimal utilisation of their abattoirs and cutting plants. As these six facilities differ as far as structural and other factors, such as locality and distance to services, are concerned, they were

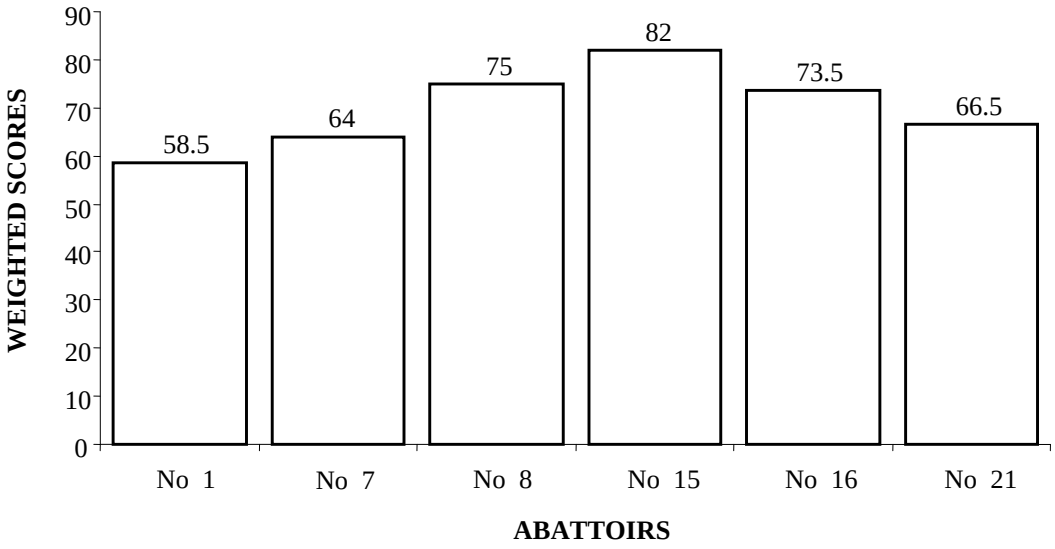

Figure 4.1 The adaptation potential of high throughput abattoirs in the Free State Province to be successfully adapted into a wild game meat export facility.

measured against a novel matrix. This indicated that by utilising existing hygiene management skills and hygiene management systems, whilst adding to or adjusting existing structures, this developmental direction may be successfully explored without considerable capital layout, towards the establishment of a new, dedicated wild game meat exporting facility in the Free State Province. The study also demonstrated that although the main production area of wild game is in the Xhariep district, the establishment of a new game meat export facility should be weighed against the possible utilisation of existing facilities flanking the Xhariep district, whilst still benefiting the district.

4.5 REFERENCES

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Chapter 5

SUMMATIVE REMARKS, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMATIVE REMARKS

The South African game industry is a relatively young industry and can be regarded as the agricultural-related industry that has grown most over the past twenty years. It now generates in excess of seven billion rand towards the South African economy annually. The industry has several branches, which include eco-tourism, live game sales, and the various forms of hunting from which wild game meat derives. The wild game animals are free ranging and have limited exposure to harmful environmental contaminants. Their meat and other products are thus "environmentally friendly" with a fairly low carbon footprint, which the industry uses to its advantage by marketing the meat as naturally organic. Wild game meat derives from various species and although not uniform in size, taste and texture, each species has its own characteristics and is therefore not marketed generically, but individually according to species. Due to its low fat content and cholesterol-lowering properties, the meat is regarded as healthy. It can furthermore be concluded that the South African game industry, despite serious challenges such as drought, land restitution, transformation issues, the crime rate, and lack of veterinary human resources, has the ability to produce, provide and sustain the provision of wild game meat for the international market. From a socio-economic perspective, the wild game meat industry is not regarded by some politicians in the same category as crop and stock farming, mainly because, in their view, game farming takes up too much land and does not create adequate employment opportunities, as it is not labour intensive. This poses questions regarding the industry's economic viability and development potential and, if these are not satisfactorily answered, social and political pressure will increase due to the undeniable need to provide sustainable food security and job opportunities for all South Africans. As the South African hunting market is limited and demand is unlikely to grow rapidly, the industry needs to invest in developing new revenue streams in order to grow. All role players have to work towards changing the image of the industry to ensure that the game meat industry is seen as a sector in which to invest.

South African game meat has the potential to distinguish itself from farmed venison in New Zealand, Australia and Europe, as game in South Africa is still untamed and game meat may be considered organic and exotic. Against this backdrop, as well as the experience gained in the marketing of alternative and exotic meat types such as crocodile and ostrich, the South African meat industry has shown the ability to compete successfully in the international arena and should therefore be able to compete just as successfully with game meat, although it is imperative that the South African product be produced under optimal hygienic conditions. Chapter 1 of this study highlighted the fact that although consumers' perceptions about wild game meat varies between sensory, nutritional, environmental and economic influences, it qualifies to be further developed into a proudly South African export product because of its unique qualities when measured against these criteria. Despite sensory and nutritional advantages, decision-making that influences choices and actions regarding the acceptability of the product is driven by the motives and emotions of individual consumers. Consumers worldwide are increasingly concerned about the environment and health-related matters, and the demand for free-ranging, naturally produced meat products with a low fat content is growing. The requirements for organic products include minimal damage to the environment, minimal use of non-renewable resources, the enhancement of biological cycles involving micro-organisms, the prohibition of agro-chemical pesticides, the careful attention to the impact of farming activities on the environment, and the conservation of wildlife and natural habitats. Consumers are more educated about these matters than previously and are demanding transparency, which is becoming synonymous with safe and high-quality food.

Traceability forms one on the cornerstones of proving credibility that not only addresses environmental concerns, but also provides securities regarding consumers' health. However, South African consumers still need to make a paradigm shift from the opinion that game is free-ranging antelope not paid for by farmers and which is harvested by sport hunters and therefore game meat should be available at reduced prices. South African consumers as a rule purchase game meat as whole wild game

carcasses at farm stalls or directly from hunters who advertise in local newspapers, and regard freshness and price as the only quality criteria of importance. However, wild game meat is seasonal and is found in limited quantities in some local supermarkets. If available, it caters to a specific niche market at highly inflated prices. Wild game biltong, however, is more freely available at butcheries and farm stalls around the country and this explains why the commercial farmers, harvesters and exporters are willing to comply with stringent requirements in order to produce a quality product for the export market where foreign currency can be earned. These factors prompted this study, which aimed to compile guidelines for producing wild game meat for the international market and measure the compliance of high-throughput red meat abattoirs to develop evaluation and development potential indicators in order to investigate the feasibility of establishing an EU-approved export abattoir in the Free State.

PROCESSING AND EXPORT REQUIREMENTS FOR WILD GAME MEAT IN SOUTH AFRICA

In order to be able to comply with the stringent requirements associated with wild game harvesting Chapter 2 of this study reviewed the export requirements for wild game meat and provided guidelines to potential developers and entrepreneurs regarding their responsibilities and requirements, as well as those of the controlling authority, for international trade in this complex commodity. It is evident that there are various role players who have to work together in order to successfully trade with wild game meat on the international front. These include the South African government for the establishment of trade treaties, and Veterinary Services as the controlling authority, since the World Organisation for Animal Health (OIE) must be given assurance regarding the occurrence of transmissible diseases and be supplied with details regarding the country's ability to apply measures to control and prevent certain listed diseases. Veterinary Services must give assurances that the exporting country has adequate staff in order to give such confirmation through surveillance, biological testing, the monitoring of vaccines applied, and veterinary certification of products, as

well as the verification of their officials' integrity and impartiality. They are further responsible for the monitoring of compliance with local legislation and international import requirements by exercising control over game farmers by facilitating the registration of farms to ensure compliance with the stringent registration requirements, and monitoring hunters/harvesters, equipment, vehicles, depots, hygiene management and operating procedures.

Additional responsibilities of the controlling authority before the final processing of the product can commence include primary meat inspection and control over the establishment of an export facility. Apart from the initial design, it is important to consider a suitable location for such a plant. The importance of correct geographical placing cannot be overemphasised, as it contributes to the feasibility of financial survival in tough economical times. The disease status of the country when exports are temporarily suspended and industrial action are some of the internal variables that may impact on profitability. It is for these reasons that an export facility should be located as close as possible to the production area and have adequate infrastructure such as a supply of suitable water that is not only bacteriologically and chemically safe, but which is also free from heavy metals. Accessibility to a proper road system to and from the production areas, airports and markets is also important. Services such as an electricity supply and waste management and effluent disposal systems must be available, and the facility should be close to a workforce residential area and services such as meat inspection, veterinary and laboratory services, as well as waste disposal systems. Chapter 2 alluded to the fact that although the business operator is responsible for ensuring compliance, the controlling authority has a major role to play in ensuring compliance with the requirements. The controlling authority may guide the implementation of systems to ensure food safety by determining objectives and monitoring traceability systems of food and food ingredients as an essential element in ensuring food safety. All laboratory results must be checked by the official veterinarian who must monitor the corrective actions taken by the business operator to ensure compliance with the required specifications of the products being exported. The

official veterinarian is responsible for checking all laboratory results as it is a reflection of the hygiene of operations. Compliance is assured by periodic audits of good hygiene practices and hazard analysis and critical control points (HACCP)-based procedures. Such audits must be performed by an official veterinarian and must cover the whole process spectrum, including the communication of inspection results, food chain information, and decisions concerning live animals, animal welfare and meat. All records of verification of procedures must be available for auditing by the controlling authority and by representatives of the importing countries.

The final demonstration of control by the exporting country is the certification by the official veterinarian stationed at the plant. By signing the export certificate he/she assures the importing country that the wild game meat was harvested on a registered farm, and that the product, as demonstrated through official controls, is free from diseases as specified in the model export certificates and certified by the state veterinarian who issued the health attestation. He/she also certifies that the meat products being exported are free from chemical residues, that they are traceable via farm registration, and that the harvesting practices were controlled as far as hygiene procedures and animal welfare are concerned. Traceability from the farm of harvest must be demonstrated right through to the batches being exported, and this information should be derived from tamperproof labelling on the products being exported. Effective recall procedures must be in place to ensure that products that were produced while the specifications were not met can be effectively traced and prevented from being exported, or that they can be withheld until effective corrective actions have been taken. The purpose of this chapter was to review the complexities of South African game harvesting for export to the EU and the importance of all role players adhering to requirements. The conclusion drawn was that although South Africa is experiencing difficulty in assuring certain countries regarding their animal disease status, the wild game industry has stringent control measures in place demonstrating transparency and proving that the industry possesses the ability to meet the demands of international trade requirements. The importance of this chapter is that it is the first document of its

kind that can be used as a source document containing guidelines to prospective entrepreneurs and developers and demonstrating that the South African meat safety legislation is in line with what is required for EU exports. This, combined with the veterinary procedural notices setting out procedures to be followed by officials, demonstrates the country's ability to continue trading with wild game meat in the international arena.

ASSESSMENT OF WILD GAME PRODUCTION AND UTILISATION IN THE XHARIEP DISTRICT

Chapter 3 of this study presented the descriptive survey of wild game utilisation in the Xhariep district of the Free State. The aim of this chapter was to cast light on wild game production and utilisation within the district in order to establish the potential for optimising this key resource to be developed into sustainable industries that could significantly contribute towards poverty alleviation through the creation of direct and indirect employment opportunities. Despite efforts to enhance local economic development through governmental agricultural projects in an attempt to improve food security and to alleviate the extreme poverty in the district, the Xhariep district of the Free State remains under economic pressure. A large proportion of the population is dependent on agriculture, which is under tremendous economic risk for a number of reasons, including drought and other natural disasters, while one-third of inhabitants are unemployed. Further difficulties in the agricultural sector would have a dire effect on the communities in the district, which is one of the main considerations that prompted this study. A survey was conducted to gather information on farming practices; the size of farming land; additional land for keeping game; species of game; the use of growth hormones, supplements and pesticides; the marketing and utilisation of game, and whether harvesting for the export market could be utilised to establish a sustainable industry that could benefit the district. The results of the study revealed that the district possesses ample resources necessary in terms of infrastructure to adequately service any suitable game meat industry to the benefit of the district. Eighty-six per cent of the

district's agricultural land was found to be made up of natural grazing. Although sheep farming is the predominant farming activity in the region, there is an abundance of game in the district, as determined by the number of game roaming on the farms of respondents taking part in the survey. This positive scenario is supported by the fact that, of all the wild game harvested for the export market in the Free State, nearly 50% was harvested in the Xhariep district. This is notwithstanding the fact that 94% of the respondents indicated that at the time of the study, they were not making use of game harvesting for the export market as a method for marketing their game. It emerged that there is significant potential for the expansion of the game industry, as several respondents indicated that they were interested in expanding their game production and that they had land available for this purpose. As the survey further revealed that the majority of respondents were not using food additives or pesticides that could leave chemical residues in the meat and that they would be willing to change their current marketing strategies, the proposed establishment of a wild game export facility in the district was concluded to be imminently feasible.

INVESTIGATION INTO THE UTILISATION OF EXISTING ABATTOIRS AS SLAUGHTER FACILITIES FOR WILD GAME MEAT EXPORT PURPOSES

Chapter 4 investigated the possible utilisation of existing high-throughput slaughter facilities in the Free State as game export establishments that meet the stringent requirements set by the European Union. Despite having an abundance of game, there are no game meat export establishments and processing plants situated in the Free State, which in essence indicates a loss of potential resources, as producers of game in the Free State are being paid local prices, whilst foreign currency is being generated by the provinces in which the Free State's game meat is processed and exported. By optimising the resources within the Free State, wealth can be generated to the benefit of the citizens of the Free State. The aim of this chapter was to assess high-throughput abattoirs via the existing health assessment system (HAS) and to utilise the results obtained through a novel matrix put forward as a mechanism to evaluate the potential

of facilities to be converted and/or developed for game meat processing. Two compliance audits were performed at high-throughput abattoirs and the mean scores used to identify the abattoirs best managed through hygiene management systems in order to identify whether suitable management skills exist to produce products for the international market. Six abattoirs were identified for further testing by utilising the newly developed matrix which, after a thorough investigation into the hygiene status, management ability, structural requirements, locality and availability of services of high-throughput abattoirs in the Free State, provided a score indicating the potential of specific abattoirs to be successfully adapted for game meat processing.

Value of the novel evaluation system: Although this method measures the potential risk to the product by measuring compliance with South African meat safety legislation, it was necessary to develop a novel evaluation matrix that could measure the readiness and development capacity of existing abattoirs toward qualifying for development into game meat export abattoirs and game meat export facilities. The matrix was developed to assess qualifying abattoirs' potential for adaptation into game processing facilities using the HAS audit results and additional measuring criteria such as structural requirements needed, the current level of veterinary involvement, and the accessibility to necessary services. The results revealed that facilities situated in or near the larger cities had a distinct advantage; however the proposed evaluation matrix also provides for the fact that the existence of proper infrastructure and the extent of quality control at remotely situated facilities may still convince prospective clients to disregard distance in favour of quality.

The value of this novel developmental potential evaluation matrix is that it can be widely used in the abattoir industry, both nationally and internationally. An added advantage is that it is not species specific. It should however, be applied objectively by knowledgeable operators in the industry. The first category of the matrix, namely hygiene management systems is determined by the HAS scores and carries a category weight of 50, which represents 50% of the total matrix score. This category represents

the safety and quality aspects of the products being produced and should therefore be a constant. Various other components may be added to the matrix in varying weights as a means of objectively evaluating or comparing similar industries in order to maximise on efficiency of sales, profits, production etc.

By utilising this system, the study concluded that it would be feasible to explore this specific marketing direction, which will require relatively minor capital layout compared to the development of a new wild game meat exporting facility in the Free State.

5.2 FINAL CONCLUSIONS AND RECOMMENDATIONS

This study set out to establish guidelines for the adaptation of high-throughput red meat abattoirs for purposes of trade and to the benefit of both the formal industry and social development of the Xhariep area. This was achieved by reviewing processing and export requirements for wild game meat in South Africa through the provision of a source document – the first of its kind – containing guidelines to prospective entrepreneurs and developers interested in entering the game meat export market. The study continued with a survey of wild game production and utilisation in the Xhariep district followed by an investigation into existing slaughter facilities as potential wild game meat export facilities, and finally developed a novel assessment matrix for the measurement of the level of compliance of existing abattoirs and their potential to be developed into EU export facilities. The study ultimately endeavoured to contribute to the prosperity of the Xhariep district and the Free State by presenting novel solutions for the optimal utilisation of one of its key resources, namely game, and should thus contribute to the wellbeing of the region and province as a whole, thus creating a better life for all.

The findings of this study have prompted the following recommendations:

1) An investigation should be launched into the establishment of the following facilities in the Xhariep district of the Free State:
   - Wild game meat abattoir and processing facility;
   - Raw-hide and skin exporting facility;
   - Hide and skin tannery;
   - Wild game novelty facility where by-products from the wild game industry can be processed (horns, ostrich feathers, etc.);
   - Facility where ready-to-eat meal packets can be produced for the local and export markets; and
   - Facility where protein-rich offal, which is currently being discarded, can be retrieved and utilised.

2) An investigation should be launched into the optimisation and utilisation of existing abattoirs, meat cutting plants and processing plants for game meat processing in the Free State.

3) An investigation should be launched into intensive game farming in order to expand the wild game meat industry to beyond the limits of the South African winter..

4) In order to promote the wild game industry and the correction inequalities of the past, it is recommended that:
   - The above-mentioned investigations be initiated by government through entering into public/private partnerships where knowledge transfer and skills development can take place in order to ensure sustainability;
   - Government, through partnerships with other departments such as Agriculture, Tourism, Environmental Affairs and Trade and Industry, launch an international marketing campaign for the promotion of South African free ranging, natural

organic game meat in order to secure an inflow of foreign currency that would stimulate the economy of the country;

- Available vacant land be secured by government via public/private partnerships for the settling of previously disadvantaged game farmers. This will address transformation in the industry and also contribute to ensuring a sustainable source of wild game;
- Transformation in the game harvesting industry be stimulated through the training of previously disadvantaged groups as professional hunters;
- The South African Game Association initiate training within the industry and access funds for the purpose through the various skills education training authorities (SETAs).

5) In order to further improve the quality of the game meat industry, it is recommended that:
   - Extensive training programmes be launched for harvesters, as well as official personnel performing farm registrations and *ad hoc* inspections during harvesting;
   - The training of field game meat inspectors/examiners be extended;
   - The game meat industry, through the South African Game Association, embarks on a training programme where knowledge gained within the industry can be transferred;
   - Controlling authorities guarantee the same compliance during harvesting operations as during process control within the game meat facilities.

The envisaged appointment of assignees for an independent meat inspection service by the controlling authority might assist in addressing the problem. However, although this might relieve the pressure on the controlling authority, it cannot replace official accountability.

FUTURE RESEARCH

The following possible research projects emerged during the study:

- A market development strategy for South African wild game meat to address the challenges regarding the various game species relating to the size of the cuts, as well as the taste, texture, grain differences, etc.;
- A bacteriological and sensory comparison between trophy meat, hunted meat and harvested meat;
- A determination of the degree of "natural" and "organic" properties of South African game meat available to the local market.

Central University of Technology, Free State

ANNEXURE A

CENTRAL UNIVERSITY OF TECHNOLOGY (FREE STATE)
SCHOOL OF AGRICULTURE AND ENVIRONMENTAL SCIENCES

PURPOSE OF QUESTIONNAIRE: To conduct a survey on the number of game in the thirteen magisterial districts that constitute the Xhariep District of the Free State Province, in order to investigate the possibility of establishing a game export abattoir for the Free State Province. At the same time, the information will be used as part of a research project in order to obtain a D. Tech. qualification at the above-mentioned institution

TITLE: GAME MEAT PRODUCTION IN THE XHARIEP DISTRICT OF THE FREE STATE PROVINCE: EVALUATING AND OPTIMISING RESOURCES

Declaration: I, Walter Derbyshire, I.D no. 500521 5093 083, a D. Tech student of the above-mentioned institution, hereby declare that the information received from this questionnaire will be used solely for the purpose for which it is gathered and that information in terms of numbers only will be published as originating from a specific magisterial district. Names and contact details will only be used to verify details which are not clear when processing the information

Signed: ..... Date: .....

Please complete a questionnaire for each farm. Tick the correct answer with an (X) or fill in the space provided. **Grey areas are for office use only.**

Questionnaire number: 1-4

Date: ……

Magisterial district of farm: 5-6

Name of contact person: .....

Tel No: .....

Cell No: .....

Name of farm (farming unit): .....

Size of farm (farming unit) (ha): ... 7-12

Size of land on which game is kept (ha): [ ] [ ][ ][ ][ ][ ][ ] 13-18

Size of (additional) land that could be converted
For keeping game, should you wish (ha): [ ] [ ][ ][ ][ ][ ][ ] 19-24

1. Please indicate the category under which the farms resort [ ] 25

(a) Conservation area	(b) Communal area	(c) Commercial area

Depending on whether (a) (b) or (c), please complete the respective section

(a) Conservation area

(i) National Parks ..... Yes | No [ ] 26

(ii) Government game reserve, nature reserve with game ..... Yes | No [ ] 27

(iii) Private game reserve, nature reserve with game ..... Yes | No [ ] 28

(b) Communal area:

Community-owned (communal farming practices) with game Yes | No [ ] 29

(c) Commercial areas:

Privately ownd on which game is kept
under various conditions ..... Yes | No [ ] 30

2. Please indicate the type of farming practised as well as fencing details

(i) mixed farming (farmed animals and game) ..... Yes | No [ ] 31

(ii) without game-proof fencing ..... Yes | No [ ] 32

(iii) game-proof fencing for non-jumping wild game ..... Yes | No [ ] 33

(iv) fully game-proof fencing ..... Yes | No [ ] 34

3. Please indicate the number of game on the mentioned farms

SPECIES		Number of game						Office use						
African elephant	*Loxodonta africana*;													35-40
Hippopotamus	*Hippopotamus amphibius*;													41-46
Giraffe	*Giraffe camelopardalis*;													47-52
SPECIES		**Number of game**						**Office use**						
Buffelo	*Syncerus caffer*;													53-58
Eland	*Taurotragus oryx*;													59-64
Kudu	*Tragellaphus strepsiceros;*													65-70
Wildebeest (Blue) (Black)	*Connochaetus taurinus*; *Connochaetes gnou*;													71-76
Waterbuck	*Kobus ellipsiprymnus*;													1-6
Gemsbuck	*Oryx gasella*;													7-12
Hartebeest (Red)	*Damaliscus buselaphus caama*;													13-18
Tsessebe (Sassaby)	*Damaliscus buselaphus lunatis*;													19-24
Zebra	*Equus burchelli*;													25-30
Mountain-zebra	*Equus zebra*;													31-36
Impala	*Aepyceros melampus*;													37-42
Springbuck	*Antidorcas marsupialus*;													43-48
Reedbuck (Rietbok)	*Reduncar undinum*;													49-54
Reedbuck(Ribbok)	*Reduncar fulvorufula*;													55-60
Vaal Rheebok	*Pelea capreolus*;													61-66
Blesbuck	*Damaliscus dorcas phillip*													67-72
Bontebok	*Damaliscus dorcas dorcas*													73-78
Nyala	*Tragelaphus angasi*;													1-6
Bushbuck	*Tragelaphus scriptus*;													7-12
Bushpig	*Potamochoerus porcus*													13-18
Warthog	*Pharcochoerus aethiopicu*													19-24
Fallow deer	*Cervus dama*													25-30
Letchwe	*Kobus leche*													31-36
Steenbuck	*Raphicerus campestris*													37-42
Ostrich	*Struthio camelus*													43-48
Other														49-54
														55-60
														61-66
														67-72
														73-78
														1-6
														7-12
														13-18
														19-24
														25-30
														31-36

														37-42
														43-48

4. Do you make use of any nutritional supplement licks for game on your farm ..... Yes | No | 49

If yes, please specify

Name/s of lick/s			Manufacturing company, if available		
		50-51			52-53
		54-55			56-57
		58-59			60-61

5. Do you make use of any pesticides for the control of external parasites on the game? (Directly on animals or on poles or trees where they have access) Yes | No | 62

If yes, please specify

Name of pesiticide			Manufacturing company, if available		
		63-64			65-66
		67-68			69-70
		71-72			73-74

6. Please indicate the utilisation of game on your farm by allocating a percentage in the appropriate spaces

   (a) Live sale of game (the live sale of game in order to relocate the game for use on other premises ..... | | | 75-77

   (b) Harvesting (commercial hunting for trade in game meat | | | 78-80

   (c) Biltong harvesting (hunting by clients, with the purpose of obtaining game meat for own use (payment involved) .... | | | 1-3

   (d) Trophy hunting (hunting by clients, for the purpose of obtaining a trophy (payment involved) ..... | | | 4-6

(e) Safari hunting (hunting by clients, usually in the presence of a professional hunter (payment involved) 7-9

(f) Sport (hunting by the farmer/owner of the farm and his friends without payment 10-12

(g) Other methods, please specity

13-15

16-18

19-21

7. If you do not currently make use of commercial harvesting for trade in game meat, please supply reasons

Abattoirs too far away from production area ..... Yes | No 22

Prices are not competitive ..... Yes | No 23

Other, please specify

24

25

26

8. If the Free State Province had an EU-approved export abattoir and the prices paid for game Were competitive with other forms of harvesting, would you change to commercial Harvesting for the trade in game meat? ..... Yes | No 27

If no, please spesify

28

29

30

END OF QUESTIONNAIRE

ANNEXURE B

Central University of Technology, Free State

SENTRALE UNIVERSITEIT VAN TEGNOLOGIE (VRYSTAAT)
SKOOL VIR LANDBOU EN OMGEWINGSWETENSKAPPE

DOEL VAN VRAELYS: Om ’n opname te maak van die hoeveelheid wild wat voorkom in die dertien landdrosdistrikte wat die Xhariep distrik van die Vrystaat Provinsie uitmaak, ten einde die moontlikheid te ondersoek van die vestiging van ‘n uitvoerwildabattoir vir die Vrystaat Provinsie. Die inligting sal ook gebruik word as ’n gedeelte van ’n navorsingsprojek vir die verkryging van ‘n D. ‘n Tech.-kwalifikasie deur bogenoemde instansie.

TITEL: DIE PRODUKSIE VAN WILDSVLEIS IN DIE XHARIEP DISTRIK VAN DIE VRYSTAAT PROVINSIE: EVALUERING EN OPTIMISERING VAN HULPBRONNE

Verklaring: Ek, Walter Derbyshire, I.D. nommer 5005215093083, ’n D. Tech. Student van bogenoemde instansie, verklaar hiermee dat die inligting wat vanaf hierdie vraelys verkry word slegs gebruik sal word vir die doel waarvoor die inligting versamel word en dat dit slegs ge-publiseer sal word as komende van ’n spesifieke landrosdistrik. Name en kontakbesonderhede sal slegs gebruik word vir die bevestiging van besonderhede tydens die verwerking van die inligting.

Geteken : ..... Datum: .....

Voltooi asseblief ’n vraelys ten opsigte van elke plaas. Voltooi asseblief die spasie voorsien by elke vraag of merk die korrekte antwoord met ‘n (X). **Die grys gedeeltes is slegs vir kantoorgebruik.**

Nommer van vraelys:		1-4
Datum: ……..		
Landdrosdistrik waarin plaas/e geleë is:		5-6
Naam van respondent:		
Tel Nr:		
Sel Nr:		
Naam van plaas/e (boerdery eenhede):		

Grootte van plaas (boerdery eenhede) (ha): | | | | | | | 7-12

Grootte van gedeeltes waarop wild aangehou word (ha): ..... | | | | | | | 13-18

Grootte van gedeeltes wat in die toekoms aangewend kan word vir die aanhou van wild (ha): | | | | | | | 19-24

1. Dui asseblief aan onder watter kategorie u plaas resorteer | | 25

(a) Bewaringsgebied	(b) Kommunale-gebied	(c) Kommersiële-gebied

Indien (a) (b) of (c), voltooi asseblief die betrokke onderafdeling

(a) Bewaringsgebied

(i) Nasionale Park ..... Ja | Nee | | 26

(ii) Staatswild- of natuurreservate waar wild aangehou word Ja | Nee | | 27

(iii) Privaat wild- of natuurreservate waar wild aangehou word Ja | Nee | | 28

(b) Kommunale gebied:

Kommunale gebiede waar wild aangehou word ..... Ja | Nee | | 29

(c) Kommersiële gebied:

Plase in privaatbesit waar wild onder verskeie omstandighede aangehou word ..... Ja | Nee | | 30

2. Dui asseblief die tipe boerdery sowel as die omheiningsbesonderhede aan

(i) Is dit gemengde boerdery (plaasdiere en wild)? ..... Ja | Nee | | 31

(ii) Is dit sonder wildwerende omheining? ..... Ja | Nee | | 32

(iii) Is dit wildwerend omhein vir nie-springende wild? ..... Ja | Nee | | 33

(iv) Is dit ten volle wildwerend omhein? ..... Ja | Nee | | 34

3. Dui asseblief aan die hoeveelheid wild op die plaas/plase:

WILDSOORTE		Hoeveelheid wild						Kantoorgebruik						
Afrika olifant	*Loxodonta africana*;													35-40
Seekoei	*Hippopotamus amphibius*;													41-46
Kameelperd	*Giraffe camelopardalis*;													47-52
WILDSOORTE		**Hoeveelheid wild**						**Kantoorgebruik**						
Buffel	*Syncerus caffer*;													53-58
Eland	*Taurotragus oryx*;													59-64
Koedoe	*Tragellaphus strepsiceros;*													65-70
Wildebees (Blou) (Swart)	*Connochaetus taurinus*; *Connochaetes gnou*;													71-76
Waterbok	*Kobus ellipsiprymnus*;													1-6
Gemsbok	*Oryx gasella*;													7-12
Hartebees (Rooi)	*Damaliscus buselaphus caama*;													13-18
Tsessebe (Sassaby)	*Damaliscus buselaphus lunatis*;													19-24
Zebra	*Equus burchelli*;													25-30
Berg-zebra	*Equus zebra*;													31-36
Impala	*Aepyceros melampus*;													37-42
Springbok	*Antidorcas marsupialus*;													43-48
Rietbok	*Reduncar undinum*;													49-54
Ribbok	*Reduncar fulvorufula*;													55-60
Vaal Rheebok	*Pelea capreolus*;													61-66
Blesbok	*Damaliscus dorcas phillipsi*													67-72
Bontebok	*Damaliscus dorcas dorcas*;													73-78
Nyala	*Tragelaphus angasi*;													1-6
Bosbok	*Tragelaphus scriptus*;													7-12
Bosvark	*Potamochoerus porcus*													13-18
Vlakvark	*Pharcochoerus aethiopicus*													19-24
Damhert (Takbok)	*Cervus dama*													25-30
Letchwe	*Kobus leche*													31-36
Steenbok	*Raphicerus campestris*													37-42
Volstruis	*Struthio camelus*													43-48
Ander														49-54
														55-60
														61-66
														67-72
														73-78
														1-6
														7-12
														13-18
														19-24
														25-30
														31-36

														37-42
														43-48

4. Maak u gebruik van enige voedingsaanvullingslekke vir die wild op die plaas ..... Ja | Nee | 49

Indien ja, spesifiseer asseblief

Naam van lek/ke			Vervaardiger, indien beskikbaar		
		50-51			52-53
		54-55			56-57
		58-59			60-61

5. Maak u gebruik van enige pesbestrydingsmiddels vir die beheer van eksterne parasiete op die wild? (Direk op wild of aan pale en/of bome waar die wild toegang het) ..... Ja | Nee | 62

Indien ja, spesifiseer asseblief

Naam/Name van middel/s			Vervaardiger, indien beskikbaar		
		63-64			65-66
		67-68			69-70
		71-72			73-74

6. Dui asseblief aan, deur die toekenning van ’n persentasie, hoe die wild op u plaas benut word.

(a) Lewndige verkope van wild (die lewendige verkope van wild ten einde die wild te hervestig of vir benutting op ’n ander terrein) ..... | | | | | | 75-77

(b) Wildoes (kommersiële jag vir handel in vleis hoofsaaklik uitvoere ..... | | | | | | 78-80

(c) Biltongjag (jag deur kliente, met die doel om vleis te verkry, hoofsaaklik vir eie gebruik (betaling is betrokke) | | | | | | 1-3

(d) Trofeejag (jag deur kliente vir die verkryging van ‘n trofee (betaling betrokke) ..... | | | | | | 4-6

(e) Safari-jag (jag deur kliente, gewoonlik in die teenwoordigheid van ’n jagter (betaling betrokke) 7-9

(f) Sport (jag deur die boer/eienaar van die plaas en sy vriende sonder betaling 10-12

(g) Ander metodes, spesifiseer asseblief

_____ 13-15

_____ 16-18

_____ 19-21

7. Indien u tans nie van kommersiële wildoes vir handel in wildsvleis gebruik maak nie, voorsien asseblief redes waarom nie:

Abattoirs te ver geleë ..... Ja | Nee 22

Pryse nie kompeterend nie ..... Ja | Nee 23

Indien ander redes, spesifiseer asseblief

_____ 24

_____ 25

_____ 26

8. Indien die Vrystaat provinsie oor ’n EU-goedgekeurde uitvoerabattour sou besik het en die pryse wat vir wild betaal word vergelykbaar was met ander vorms van wildbenutting, sou u u huidige vorm van wildbenutting verander na kommersiële wildoes vir handel in wildsvleis? ..... Ja | Nee 27

Indien nee, verskaf asseblief redes:

_____ 28

_____ 29

_____ 30

EINDE VAN VRAELYS

ANNEXURE C

DEPARTMENT OF AGRICULTURE
FREE STATE PROVINCE

Directorate: Veterinary Services

Sub-Directorate: Veterinary Public Health

P O BOX 6252, Bloemfontein, 9300
Telephone: (051) 436-3677
Fax: (051) 436-3262
Email: bets@glen.agric.za

DOCUMENT NO:	NARS-HAS01	**COMPILED BY:**	NARS Committee
ISSUE NO:	V1.4-03-2009	**APPROVED BY:**	Director Veterinary Services
EFFECTIVE DATE:	1st April 2009	**NUMBER OF PAGES**	24

Instrumentation:	Thermometer:	Serial No	
	Light meter:	Serial No	

HYGIENE ASSESSMENT SYSTEM CHECKLIST:

HIGH THROUGHPUT
RED MEAT ABATTOIRS

ABATTOIR: ……

AUDIT DATE: ……

HYGIENE ASSESSMENT SYSTEM:

HIGH THROUGHPUT RED MEAT ABATTOIRS

Index

ABATTOIR:_____ REGISTRATION NO: _____ DATE: _____

DAILY THROUGHPUT: C _____ P _____ S _____ Other_____

INSPECTION COMPONENT:

RANK	NAME	REGISTERED		EMPLOYER
		YES	NO	
VETERINARIAN:				
MEAT INSPECTORS:				
MEAT EXAMINERS:				
MEAT CLASSIFIER				

OWNER / MANAGER

NAME	CAPACITY	ADDRESS / PHONE / FAX

HYGIENE MANAGER

NAME	CAPACITY	ADDRESS / PHONE / FAX

HAS - SCORE SHEET

CATEGORY	CATEGORY SCORE	WEIGHT	WEIGHTED SCORE
A. ANTE MORTEM		.07	
B. SLAUGHTERING AND DRESSING		.15	
C. MEAT INSPECTION / MARKING		.15	
D. CHILLING / DISPATCH		.15	
E. OFFAL PROCESSING		.03	
F. SANITATION / PEST CONTROL		.10	
G. PERSONNEL		.07	
H. GENERAL CONDITIONS		.08	
I. STRUCTURE & MAINTENANCE		.10	
J. HYGIENE MANAGEMENT SYSTEM		.10	
FINAL SCORE			

DETAILS OF PROVINCIAL INSPECTORS WHO HAS VERIFIED THE HAS ASSESSMENT

Name:……..……

Signature:……..

_____

Name:……..……

Signature:……..

	A 7	B 15	C 15	D 15	E 3	F 10	G 7	H 8	I 10	J 10	FINAL SCORE	
100 95 90 85												EXCELLENT
80 75 70 65												GOOD
60 55 50 45												FAIR
40 35 30 25												POOR
20 15 10 5												CRITICAL

HYGIENE ASSESSMENT SYSTEM EVALUATION SHEET

(Circle one number only)

A. ANTE-MORTEM

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. Control measures for transport of animals		**Comments**	**14**	**11**	**7**	**3**	**0**
• Separate entrances for clean and dirty side • Entrances controlled • Persons responsible for receiving and off-loading are trained. • System to verify off loading trucks complying with requirements. • Facilities utilized for washing all trucks. • Compliance with Animal Welfare Code Of Conduct	6 (c)(e); 64; 65, 66;						

2. Humane handling		**Comments**	**20**	**15**	**10**	**5**	**0**
• Trained staff responsible for handling animals. (No shouting, hitting, wool pulling, prodders used on pigs /inhumane marking of animals) • Adequate offloading ramps for various heights utilized • Rest periods applied • Maximum periods in lairages abided with • Feeding of animals when required • Clean drinking water available and accessible to all animals • Compliance with Animal Welfare Code Of Conduct	19 22(2) 66 67 68 69						

3. Lairages		**Comments**	**16**	**12**	**8**	**4**	**0**
• Adequate water supply to all lairages. . • Isolation facility available and used correctly • Lairages equipped with notices specifying number and type of species permitted • Lairages cleaned between each batch	20; 21; 22; 47 (2) (c) 55 (c) (ix) ee 66; 67; 68;						

4. Ante-mortem inspection		**Comments**	**20**	**15**	**10**	**5**	**0**
• Ante-mortem done on all animals by inspector • Full communication with slaughter floor & inspectors. • Blood smears done on all DOA's & DIP's	79 - 83 55 (a)						

5. System for emergency slaughter		**Comments**	**14**	**11**	**7**	**3**	**0**
• System to identify injured animals and immediate integration onto slaughter list . • Emergency slaughter facility/entrance correctly used • SOP for emergency slaughtering followed.	70; 6 (j) 107						

6. System for isolation / last kill		**Comments**	**16**	**12**	**8**	**4**	**0**
• Effective system to identify and handle excessively dirty animals, especially pigs and wet muddy sheep. • System to identify diseased / contaminated animals and separate them from other stock. • SOP's for handling and slaughter of C and T branded cattle followed. • Arrangements for slaughtering last in the day.	20 55 (a) (c) 71 82						

CATEGORY A. Ante-mortem score_____

B. SLAUGHTERING AND DRESSING

1. Slaughter Process for Cattle/Horses

1. Stunning:	Regulation Reference	Comments	EXCELLENT 10	GOOD 8	FAIR 5	POOR 2	CRITICAL 0
• Humane handling of animals. • Rate of stunning correlated with dressing • Effective operational procedures, • Operational parameters for stunning displayed • Captive bolt well maintained. • Backup system for stunning	67; 69; 25; 72; 73.;						

2. Time period: stunning to bleeding:		Comments	4	3	2	1	0
• Correct shackling and hoisting procedures. • Bleeding within 60 seconds	25(4); 74(1)						

If no stunning (Kosher, Halaal) ignore 1& 2 and multiply subtotal for cattle/horses by 1,163

3. Bleeding:		Comments	6	5	3	2	0
• System to ensure knives is sharp. • Cutting of throat or sticking • Each animal bled with clean and sterilized knife . • No mixing of clean and dirty knives	74 (2) 74 (3)						

4. Time period: bleeding to dressing:		Comments	4	3	2	1	0
• Cattle minimum – 8 min. Calf minimum – 6 min. • No dressing started until completion of bleeding period.	75						

5. Dressing process for cattle:		Comments	50	38	25	12	0
• Dressing commenced without delay after completion of bleeding. • Well trained personnel to ensure correct procedures and techniques are used. • Heads and feet must be available for meat inspection and correlated to the carcass of origin • All lactating udders removed intact and leaving *Lnn Inguinalis superficialis* on both sides • All opening lines made from inside to outside. • Knives washed and sterilised after opening lines before flaying proceeds. • Air knives not used for opening lines • All flaying and evisceration equipment making contact with meat must be sterilized after use on each carcass. • SOP's for contamination and dropped carcasses followed. • The intestines may not be separated from the stomach or paunch during evisceration • All organs and viscera must be made available for meat inspection and must be identifiable with the carcass of origin • Incidental contamination on meat removed by trimming by inspector and not by washing. • The carcasses of cattle older than three months are split lengthways through the spinal column before meat inspection • The stomach or paunch, the intestines, uterus, urinary and gall bladders not opened in the slaughter area • Gall bladders removed unopened after meat inspection • No contact of exposed meat with platforms, walls, floors or outer surface of the skin • Carcasses not cleaned with brush, cloth, paper towels, etc	76; 55 (b) 55 (h).						

6. Final washing of carcasses	Regulation Reference	Comments	EXCELLENT 10	GOOD 8	FAIR 5	POOR 2	CRITICAL 0
• If done, only after inspection. • Water quality according to SABS 241 Class II • Carcasses washed sufficiently to remove bone splinters on spinal column as well as blood on neck area and visceral pleura • No insecticide or antibiotic substance, or any substance which is intended to prevent the spoilage of the carcass, meat or animal product by inhibiting the activities of insects, or by preventing the development of bacteria or moulds, or for any purpose whatsoever are applied to any carcass, meat or animal product. • If done; only as per approved protocol.	17 77 (1) (2) 76 (6) (8)						

7. Sterilisers		Comments	16	12	8	4	0
• All sterilisers in slaughter areas are ≥82 °C with proper overflow to ensure clean water and are used according to correct procedures and frequency. • Assessable to all workers (within 3 meters) • Control measures for hot water system breakdown and/or drop in temperature followed • Any other method of sterilization done only according to an approved protocol	14 (1); 14(2) 55 (f)						

Sub-total for slaughtering of cattle_____

If no stunning (Kosher, Halaal) ignore 1 & 2 and multiply subtotal for cattle/horses by 1,163

2. *Slaughter Process for Pigs*

1. Stunning		Comments	10	8	5	2	0
• Humane handling of animals. • Stunning correlated with line speed • Effective operational procedures, (effective stunning) • Well maintained electrical stunner. • Correct Voltage, Amperage and time used according to manufacturer • Operational parameters for stunning displayed • Correct placing of electrodes on head • Backup stunning system available.	25 73						

2. Time period: stunning to bleeding		Comments	4	3	2	1	0
• Correct shackling and hoisting procedures. • Bleeding within 60 seconds	74 (1)						

3. Bleeding and sterilising of bleeding knives		Comments	6	5	3	2	0
• System to ensure knives is sharp. • Cutting of throat or sticking • Each animal bled with clean and sterilized knife. • No mixing of clean and dirty knives	74 (2) (3)						

4. Time period: bleeding to dressing		Comments	4	3	2	1	0
• Pigs minimum – 6 min. • No dressing started until completion of bleeding period	75						

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
5. Dressing process for pigs		**Comments**	**50**	**38**	**25**	**12**	**0**
• Dressing commenced without delay after completion of bleeding. • Well trained personnel to ensure correct procedures and techniques are used. • Scalding, scraping and pre-evisceration washing completed in the dehairiing area before moving to the evisceration area.. • Heads and feet must be available for meat inspection and correlated to the carcass of origin • All lactating udders removed intact and leaving *Lnn Inguinalis superficialis* on both sides • All evisceration equipment making contact with meat must be sterilized after use on each carcass. • SOP's for contamination and dropped carcasses followed. • The intestines may not be separated from the stomach during evisceration • All organs and viscera must be made available for meat inspection and must be identifiable with the carcass of origin • Incidental contamination on meat removed by trimming by inspector and not by washing. • The carcasses of pigs heavier than 92 kg are split lengthways through the spinal column before meat inspection • The stomach, the intestines, uterus, urinary and gall bladders not opened in the slaughter area • Gall bladders removed unopened after meat inspection • No contact of exposed meat with platforms, walls and floors • Carcasses not cleaned or dried with brush, cloth, paper towels, etc	76; 55 (b) 55 (b) 55 (h).						

6. Final washing of carcasses		**Comments**	**10**	**8**	**5**	**2**	**0**
• If done, only after inspection. • Water quality according to SABS 241 Class II • Carcasses washed sufficiently to remove bone splinters on spinal column as well as blood on neck area and visceral pleura • No insecticide or antibiotic substance, or any substance which is intended to prevent the spoilage of the carcass, meat or animal product by inhibiting the activities of insects, or by preventing the development of bacteria or moulds, or for any purpose whatsoever are applied to any carcass, meat or animal product. • If done; only as per approved protocol.	17 77 (1) (2) 76 (6) (8)						

7. Sterilisers		**Comments**	**16**	**12**	**8**	**4**	**0**
• All sterilisers in slaughter areas are ≥82 ^{o}C with proper overflow to ensure clean water and are used according to correct procedures and frequency. • Assessable to all workers (within 3 meters) • Control measures for hot water system breakdown and/or drop in temperature followed • Any other method of sterilization done only according to an approved protocol	14 (1); 14(2) 55 (f)						

Sub-total for slaughtering of pigs_____

3. Slaughter Process for Sheep

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. Stunning of sheep		**Comments**	**10**	**8**	**5**	**2**	**0**
• Humane handling of animals. • Stunning correlated with line speed • Effective operational procedures, (effective stunning) • Well maintained electrical stunner. • Correct Voltage, Amperage and time used according to manufacturer • Operational parameters for stunning displayed • Correct placing of electrodes on head • Backup stunning system available.	25 73						

2. Time period: stunning to bleeding		**Comments**	**4**	**3**	**2**	**1**	**0**
• Correct shackling and hoisting procedures. • Bleeding within 60 seconds	74 (1)						

If no stunning (Kosher, Halaal) ignore 1& 2 and multiply subtotal for sheep by 1,163

3. Bleeding and sterilising of bleeding knife		**Comments**	**6**	**5**	**3**	**2**	**0**
• System to ensure knives is sharp. • Two knife system in use. • Supervision to ensure correct procedures at all times. • Knives washed and sterilized between every animal • No mixing of clean and dirty knives.	74 (2) (3)						

4. Time period: bleeding to dressing		**Comments**	**4**	**3**	**2**	**1**	**0**
• Sheep minimum – 6 min. • No dressing started until completion of bleeding period.	74 (1) (2); 75						

5. Dressing process for sheep		**Comments**	**50**	**38**	**25**	**12**	**0**
• Dressing commenced without delay after completion of bleeding. • Well trained personnel to ensure correct procedures and techniques are used. • Heads and feet must be available for meat inspection and correlated to the carcass of origin • All lactating udders removed intact and leaving *Lnn Inguinalis superficialis* on both sides • All opening lines made from inside to outside. • Knives washed and sterilised after opening lines before flaying proceeds. • Air knives not used for opening lines • All flaying and evisceration equipment making contact with meat must be sterilized after use on each carcass. • SOP's for contamination and dropped carcasses followed. • The intestines may not be separated from the stomach or paunch during evisceration • All organs and viscera must be made available for meat inspection and must be identifiable with the carcass of origin • Incidental contamination on meat removed by trimming by inspector and not by washing. • The stomach or paunch, the intestines, uterus, urinary and gall bladders not opened in the slaughter area • Gall bladders removed unopened after meat inspection • No contact of exposed meat with platforms, walls, floors or outer surface of the skin • Carcasses not cleaned with brush, cloth, paper towels, etc	76; 55 (b) 55 (h).						

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
6. Final washing of carcasses		**Comments**	**10**	**8**	**5**	**2**	**0**
• If done, only after inspection. • Water quality according to SABS 241 Class II • Carcasses washed sufficiently to remove bone splinters on spinal column as well as blood on neck area and visceral pleura • No insecticide or antibiotic substance, or any substance which is intended to prevent the spoilage of the carcass, meat or animal product by inhibiting the activities of insects, or by preventing the development of bacteria or moulds, or for any purpose whatsoever are applied to any carcass, meat or animal product. • If done; only as per approved protocol.	17 77 (1) (2) 76 (6) (8)						

7. Sterilisers		**Comments**	**16**	**12**	**8**	**4**	**0**
• All sterilisers in slaughter areas are ≥82 ºC with proper overflow to ensure clean water and are used according to correct procedures and frequency. • Assessable to all workers (within 3 meters) • Control measures for hot water system breakdown and/or drop in temperature followed • Any other method of sterilization done only according to an approved protocol	14 (1); 14(2) 55 (f)						

Sub-total for slaughtering of sheep_____

If no stunning (Kosher, Halaal) ignore 1& 2 and multiply subtotal for sheep by 1,163

Total Category B =(Total for cattle/horses + pigs + sheep) ÷ by number of species slaughtered

(one specie ÷ 1 ; two species ÷ 2 ; three species ÷ 3)

___ + ___ + ___ ÷ ___ = CATEGORY B. Slaughtering and dressing score _____

C. MEAT INSPECTION / MARKING

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. Meat Inspection Component		**Comments**	**14**	**11**	**7**	**3**	**0**
• Correct number of inspectors/examiners as determined by PEO • All inspection personnel registered with PEO • Competency checks on meat inspection personnel (skills maintenance program) • Continuous meat inspection during slaughter process	1(r) 55(c) 84						

2. Correlation of carcasses and offal		**Comments**	**14**	**11**	**7**	**3**	**0**
• System and equipment in place to correlate all carcasses and viscera during slaughter process. • Correlation after slaughter (detained carcasses) for secondary meat inspection.	55 (c) (iv); 85(6) 106						

3. Lighting at Primary and Secondary Inspection		**Comments**	**12**	**9**	**6**	**3**	**0**
• Lighting at all inspection points at 540 lux minimum	11 (k) (ii)						

4. Primary meat inspection*		**Comments**	**26**	*	*	*	**0**
• All inspection items attended to as per control list.	84 - 105						

**** AWARD POINTS AS PER INSPECTION CHECKLIST (26)***

5. System for handling condemned material		**Comments**	**16**	**12**	**8**	**4**	**0**
• Condemned material are portioned and placed in a theft proof container which has been clearly marked "CONDEMNED", in letters not less than 10 cm high, • Or alternatively conspicuously marked with a stamp bearing the word "CONDEMNED", using green ink; • Are kept in a holding area or a room or dedicated chiller provided for the purpose, except if removed on a continuous basis • Removed from the abattoir at the end of the working day or secured in a dedicated chiller or freezer at an air temperature of not more than minus 2 °C • Uteri only opened in condemned area by vet. if thought necessary and skins not harvested. • Detention/condemn facilities used correctly for grade abattoir. • Control measures for provisionally passed carcasses, organs followed	18 6 (t) 55 (c) (vi) 55 (c) (ix) 118 81 119						

6. Secondary meat inspection		**Comments**	**4**	**3**	**2**	**1**	**0**
• Veterinarian is available and does secondary inspection as per approved policy • All organs made available and correlated with detained carcass • DFI utilized as prescribed • Laboratory tests done when required • Steriliser in DFI working • Re-inspection of online trimming by trimmers/workers • Suspect carcasses marked as "Detained" • All emergency slaughtered animals detained for secondary inspection	55(c) 76(7) 80 106 - 109						

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
7. Cysticercosis carcass and -offal control*		**Comments**	**6**	**5**	**3**	**1**	**0**
• Cysticercosis record system accurate and includes positive identification of carcasses, cuts and offal, dates, temperatures. • Carcasses and offal or cartons if deboned, are clearly marked/tagged as cysticercosis meat with an "M". • Chilling prior to freezing. • Cysticercosis protocol followed. • Approved protocol for when freezers not on premises are used for treating cysticercosis carcasses/offal	105; 6 (s)						

If all measly carcasses/offal are condemned as a rule or with horses, ignore 7 and multiply Category C score by 1,041

8. Approved stamp		**Comments**	**4**	**3**	**2**	**1**	**0**
• At all times only under the inspector's control. • Stamp placed clearly/legible on all four quarters of passed carcasses. • When not in use kept clean and secure. • Only ink approved for use on foodstuffs used.	112; 115; 116; 55 (c)						

9. Roller markings/ Classification stamps		**Comments**	**4**	**3**	**2**	**1**	**0**
• At all times under the meat classifier's control • Marks placed on both sides of all passed carcasses. • Kept clean and secure when not in use. • Only ink approved for use on foodstuffs used.	112; 113; 116; 55 (c)						

If no classification is done, ignore 9 and multiply Category C score by 1,042

CATEGORY C. Meat Inspection / Marking score_____

If all measly carcasses/offal are condemned as a rule or with horses, ignore 7 and multiply Category C score by 1,042
If no classification is done, ignore 9 and multiply Category C score by 1,042
If measly carcasses/offal are condemned and no classification is done, ignore 7 & 9 and multiply Category C score by 1,087

CONTROL LIST FOR PRIMARY MEAT INSPECTION

Section A Abattoir:…… Date:……

Method of inspection:

O = Observation **P** = Palpation **I** = Incision Inspector:…… Controlling Officer:……

	CATTLE			SHEEP			PIGS			HORSES			COMMENTS:
HIND-QUARTER:													
Parietal peritonium	**O**			**O**			**O**			**O**			
Diaphragm			**I**			**O**			**I**				
Lnn. Iliaci			**I**	**O**					**I**			**I**	
Lnn. subiliacus			**I**		**P**							**I**	
Lnn inguinales superficiales			**I**		**P**		**O**		**I**				
Lnn. analis					**P**								
Kidneys			**I***	**O**	**P**				**I***			**I***	* By exposure and if necessary, incise
Lnn. renalis			**I***		**P**				**I***			**I***	* If necessary
Lnn. popliteus					**P**								
Feet	**O**			**O**			**O**						
Vertebrae & spinal cord if split	**O**						**O**			**O**			
FORE-QUARTER:													
Parietal Pleura	**O**			**O**			**O**			**O**			
Lnn. cervicales superficiales		**P**			**P**						**P**		
M triceps brachii			**I**						**I***				*Except baconers 54 – 92 kg
Feet	**O**			**O**			**O**			**O**			
Sternum, ribs, vertebrae if split	**O**						**O**			**O**			
HEAD:													
Tongue	**O**	**P**		**O***			**O**				**P**		*Only if necessary
Hard / soft palate	**O**			**O***			**O**			**O**			*Only if necessary
Skin / lips / gums	**O**			**O**			**O**			**O**			
Eyes / nostrils	**O**			**O**			**O**			**O**			
Lnn. Mandibulares			**I**	**O***					**I**				*Only if necessary; can also be incised
Lnn. Parotidei			**I**	**O***					**I**				*Only if necessary; can also be incised
Lnn. Retropharyngialis			**I**	**O***									*Only if necessary; can also be incised
M. masseter muscle X 2			**I**						**I**				
M pterygoideus muscle X1			**I**						**I**				
Tonsils removed after inspection			**I**										
RED OFFAL:													
Visceral pleura	**O**			**O**			**O**			**O**			
Liver		**P**	**I**		**P**	**I**		**P**	**I**		**P**	**I**	
Lnn. hepaticus			**I**			**I**			**I**			**I**	
Trachea			**I**	**O**	**P**	**I**			**I**	**O**	**P**	**I**	
Oesophagus	**O**			**O**	**P**		**O**			**O**	**P**		
Lungs		**P**	**I**	**O**	**P**			**P**	**I**	**O**	**P**		
Lnn. mediastinales			**I**		**P**				**I**				
Lnn. bronchiales			**I**		**P**				**I**				
Pericardium			**I**			**I**			**I**			**I**	
Heart			**I**			**I**			**I**			**I**	
Spleen	**O**		**I***	**O**			**O**		**I***	**O**	**P***		* Only if necessary
Tail	**O**						**O**			**O**			
Thyroid gland	**O**												
Diaphragm (visceral)	**O**			**O**			**O**			**O**			
Testes	**O**			**O**			**O**			**O**			
ROUGH OFFAL:													
Visceral peritoneum	**O**			**O**			**O**			**O**			
Outer surface of stomach, int	**O**			**O**			**O**			**O**			
Inner surface of stomach, int			**I***			**I***			**I***				*Only if necessary; In offal room or DFI
Lnn. gastrici	**O**			**O**			**O**						
Lnn.mesenterici (cran & caud)	**O**			**O**			**O**		**I***				*Only if necessary
Omentum	**O**			**O**			**O**			**O**			
	(49)			(45)			(45)			(35)			

Section B With above inspection the following must be considered:

	C	P	S	H
State of nutrition				
Colour				
Odour				
Symmetry				
Efficiency of bleeding				
Contamination				
Pathological conditions				
Parasitic infestation				

	C	P	S	H
Injection marks				
Bruising & Injuries				
Any abnormalities				
Age & sex of animal				
(12)				

SCORE		
CATTLE	(A+B) ÷ 1.173	
SHEEP	(A+B) ÷ 1.096	
PIGS	(A+B) ÷ 1.096	
HORSES	(A+B) **x** 1.106	
	Sub-total	
One species: ÷ by 1 Two species: ÷ by 2 Three species: ÷ by 3 Four species: ÷ by 4		
TOTAL	(52 ÷ 2) =	

D. CHILLING / DISPATCH

1. Chilling

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1.1 Spacing of carcasses		**Comments**	**6**	**5**	**3**	**1**	**0**
• Carcasses spaced and positioned to ensure airflow between all carcasses. • Chillers loaded to capacity stated on the door,	28 (3); 41 (1); 40 (4)						

1.2 Cold Storage Management		**Comments**	**26**	**20**	**13**	**6**	**0**
• No mixing of warm and cold carcasses or meat. • Warm products are only loaded into chiller after out loading and cleaning. • No non-food item or product other than meat stored in carcass chillers • No excessive condensation • Edible products in crates, plastic bags not in direct contact with walls and floor –barrier crates or proper stands used. • No old or mouldy meat. • No open meat together with cartons and rough offal. • Free from odours • Returns re-inspected before acceptance	41(2) (3) (5) (7) 43 (3) (4) (5); 45 (7); 48 (1)						

1.3 Sanitation of chillers		**Comments**	**4**	**3**	**2**	**1**	**0**
• All chillers cleaned and sanitized after each cycle of chilling and removal of all meat. • Drip trays under cooling units cleaned	40 (3) (c); 43 (5); 48						

1.4 Effective chilling		**Comments**	**30**	**23**	**15**	**7**	**0**
• All chilled meat <7 °C at out loading. • Thermometers/Thermographs calibrated at least annually • Hygiene manager notified in case of temp breakdowns	39 (2); 40 (1); 55 (n) (x) (xi);						

2. Dispatch

2.1 Control measures for meat vehicles		**Comments**	**6**	**5**	**3**	**1**	**0**
• Checklist for loading trucks as well as follow up system on non-conformances • Carcasses and meat loaded properly off the floor. • Protocol on informal traders followed • Truck wash facility utilized	45 (1) (4) (6);						

2.2 Personal hygiene of out loading area workers		**Comments**	**6**	**5**	**3**	**1**	**0**
• Additional protective clothing in good condition, provided and used on a daily basis. • Changed as necessary when contaminated.	59 (1) (2) (5)						

2.3 Quartering saw and knives *		**Comments**	**4**	**3**	**2**	**1**	**0**
• All equipment cleaned & sterilized during and after use. • Equipment stored in approved place provided.	29, 37 (1);						

***Ignore 2.3 if not done at all and multiply the Category D: Chilling/Dispatch score by 1.042**

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
2.4 Handling of rollers and cradles		**Comments**	**4**	**3**	**2**	**1**	**0**
• System for handling and sanitizing rollers and cradles, containers, crates, barrier crates after use followed • Cleaned and sterilized on a continuous basis. • No cross or contra flow of rollers to and from the sanitation facility	29 43 (1)						

2.5 Unauthorised persons in dispatch		**Comments**	**4**	**3**	**2**	**1**	**0**
• Effective control over persons entering dispatch area.	56						

2.6 Temperature controlled out loading area		**Comments**	**10**	**8**	**5**	**2**	**0**
• Out loading area temperature controlled to <12°C at all times when in use. • Prescribed docking system used correctly	6 (u)						

CATEGORY D. Chilling / Dispatch score _____

Ignore 2.3 if not done at all and multiply the Category D: Chilling/Dispatch score by 1.041

E. OFFAL PROCESSING:

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. Rough Offal cleaning process		**Comments**	**20**	**15**	**10**	**5**	**0**
• Rough offal is cleaned effectively under running cold water. • Cleaned offal hanged on hooks for drip drying and cooling • Offal, including masked heads and feet, handled away from the floor. • System in use to handle full production effectively to prevent congestion (bottle neck situations).	31 (1); 32(2)						

2. Red Offal handling		**Comments**	**26**	**20**	**13**	**6**	**0**
• Further separation , cutting or packing of red offal, including unmasked heads done in separate red offal room • Products handled away from the floor. • System in use to handle full production effectively to prevent congestion (bottle neck situations). • Correct handling of gallbladders • Products washed under clean running water	30 (1); 76(10)						

3. Chilled or removed continuously within 4 hours		**Comments**	**14**	**11**	**7**	**3**	**0**
• Products out loaded continuously within 4 hours after evisceration or chilled in a chiller, • No mixing of red and rough offal in chillers. • Red offal chilled to <7°C within 16 hours if not removed continuously. • Rough offal chilled at minus 2°C air temperature if not removed continuously.	5 (q) (i) (ii) 30 (1) (2); 31 (4)						

4. Packaging/Freezing of offal		**Comments**	**14**	**11**	**7**	**3**	**0**
• Packing done in a separate room • System in place to keep packaging material away from open meat • Adequate facilities for throughput / offal handled away from floor • Storage facilities for bulk packaging material used correctly	5 (w); 30 (4); 31 (3); 55 (l)						

5. Dispatch of offal		**Comments**	**20**	**15**	**10**	**5**	**0**
• No mixing of red and rough offal in dispatch areas. • Effective control over unauthorised persons entering dispatch • Protocol on informal traders followed	30 (2) 56; 45 (8)						

6. Handling of rumen contents		**Comments**	**6**	**5**	**3**	**1**	**0**
• Adequate facilities and procedures to effectively remove all ruminal and intestinal contents from the rough offal room. • Removed from premises daily	31 (2)						

CATEGORY E. Offal Processing score _____

F. SANITATION & VERMIN CONTROL:

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. Post Slaughter Sanitation		**Comments**	**20**	**15**	**10**	**5**	**0**
• Effective detailed sanitizing program in use and commences immediately after all edible material is removed. • Approved by registered inspector • Overhead equipment cleaned as part of the program. • Storage of chemicals controlled	47 (1) 47 (2); 47 (4); 55 (h)						

2. Water and equipment for sanitation		**Comments**	**14**	**11**	**7**	**3**	**0**
• Potable water • Hot water at 82ºC for hand equipment • Warm water at 40ºC at hand wash basins for hands • Warm water at 40ºC for general cleaning purposes • Necessary equipment needed for sanitation	46						

3. Pre-slaughter check program		**Comments**	**16**	**12**	**8**	**4**	**0**
• Effective pre-production monitoring program to ensure all areas cleaned and disinfected before next production commences. • Includes microbiological monitoring	47 (5) 47 (2) (e) 55 (h) (x)						

4. Continuous cleaning		**Comments**	**20**	**15**	**10**	**5**	**0**
• Program for continuous cleaning during production, breaks and shift changes as well as the ongoing removal of waste material followed. • Care is taken to avoid contamination or splash back onto carcasses. • Effective crate/trolley/hooks/roller washing system in place.	47 (3) 55 (h) (viii)						

5. Availability of sanitizers and detergents		**Comments**	**10**	**8**	**5**	**2**	**0**
• Storage and distribution of chemicals controlled • Chemicals in store room correlates with data sheets • Chemicals used strictly as prescribed by manufacturer	6(cc) 47 (2) 55 (h) (iv) (dd)						

6. Vermin control program		**Comments**	**20**	**15**	**10**	**5**	**0**
• Vermin control program followed and effective	55 (j) 11(c)(iv)						

CATEGORY F. Sanitation/Vermin control score _____

PERSONNEL :

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. Protective clothing		**Comments**	**28**	**25**	**18**	**9**	**0**
• Clean light coloured protective clothing provided daily to all workers. • All protective clothing used in good repair. • Protective clothing includes hair nets and beard nets where applicable • Private clothes are kept in a locker that is reserved for that purpose only. • Protective clothing completely covers all personal clothing • Workers in clean/dirty areas identifiable by distinctive protective clothing. • Clean protective clothing is stored and handled so that it does not make contact with private clothes • Personnel don't sit or lie on the ground in their protective clothing during rest periods • Personnel don't wear protective clothing outside the premises. • Washed only on premises or at a laundry • Management, visitors and maintenance personnel issued with protective clothing before entering production areas.	13 (4) 56 59						

2. Personal hygiene		**Comments**	**32**	**24**	**16**	**8**	**0**
• Personnel handling foodstuff shower before assuming duty • General code of conduct regarding hygiene practices followed • Code of conduct approved by registered inspector • Staff well trained in personal hygiene. • No movement of personnel between clean and dirty areas • Jewellery, including traditional objects, is not worn in an area where edible products are handled. • Fingernails are short, clean and free of nail varnish. • Personnel refrains from any contaminatory actions • Liquid germicidal soap at all hand wash basins • Correct use of ante-chambers	6(v) 55 (d) 61 62 63						

3. Injuries and health checks		**Comments**	**16**	**12**	**8**	**4**	**0**
• All workers examined daily • Cuts, abrasions, sores, etc covered by waterproof dressing • System in place to identify personnel ill for 3 days or longer, medical examination done to verify fitness to work as a food handler.	58 60						

4. Change rooms and Toilets		**Comments**	**14**	**11**	**7**	**3**	**0**
• Toilet paper and germicidal soap available during production hours • Hand drying facilities available and used • Clean and without bad smells	6(u); 13; 55(g);						

5. Dining facilities		**Comments**	**10**	**8**	**5**	**2**	**0**
• Available and utilized correctly • Fly proof food storage facilities kept clean and tidy	6(x); 13 (5)						

CATEGORY G. Personnel score _____

G. GENERAL CONDITIONS

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. Registration Certificate		**Comments**	**6**	**5**	**3**	**1**	**0**
• Registration Certificate valid and available on request. • Conditions of certificate abided with	8(i)(c) of the Act						

2. Conformation of structure with design drawings		**Comments**	**4**	**3**	**2**	**1**	**0**
• No unauthorized.structural changes	2						

3. Premises		**Comments**	**10**	**8**	**5**	**2**	**0**
• Fencing around the premises in good condition • Entrance gates controlled • Roads and walkways adequately maintained. • Premises kept neat and tidy to prevent a health hazard. • Clean/dirty separation well managed / no cross flow • All areas kept dust and mud free • Vehicle loading and offloading areas for meat must be paved, curbed, drained and roofed	6(b)(c) 8(a) 9(1) 9(4) 10						

4. Water supply and quality		**Comments**	**20**	**15**	**10**	**5**	**0**
• Reticulation system in good state of repair. • Water pressure and volume adequate for all purposes. • Quality according to SABS 241 Class II • Hose reels used as prescribed • Warm water @ 40ºC for hand wash basins and sanitizing available	17 55(i);						

5. Effectiveness of drainage system / effluent disposal		**Comments**	**14**	**11**	**7**	**3**	**0**
• Enclosed effluent disposal system, solids /fat traps effective. • Storm water drainage effective • No obnoxious odours from drains	9(2)(3) 11(c) 14(c) 15(e) 40(3)						

6. Disposal of waste material		**Comments**	**16**	**12**	**8**	**4**	**0**
▪ Adequate facilities to handle waste material ▪ HMP for handling of the different categories of waste followed	18(5) 55(k)						

7. Disposal of condemned material		**Comments**	**30**	**23**	**15**	**7**	**0**
• HMP and protocols followed. • Slashing and spraying with obnoxious colorant before burial • Effective security and control. • Transport used correctly • Containers leak proof and sealed	55(k) 118 119 123						

CATEGORY H: General Conditions Score: _____

H. STRUCTURAL REQUIREMENTS AND MAINTENANCE:

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. Pens / lairages / crushes / races		**Comments**	**10**	**8**	**5**	**2**	**0**
• Accommodate at least one day's throughput • Roofed for pigs and sheep • Well maintained, floors. rails, drains, drinking troughs and nipples, roof, loading ramps, feeding troughs, etc • Prescribed notices maintained in a legible condition	6 (f) 20 22(2) 23 24						
2. Sanitizing facilities for trucks		**Comments**	**10**	**8**	**5**	**2**	**0**
• Well maintained facility for live animal trucks • Separate well maintained facility for meat trucks	6(e) 6(gg)						
3. Slaughtering and dressing area		**Comments**	**14**	**11**	**7**	**3**	**0**
▪ Well maintained restraining, stunning, bleeding areas and slaughter hall (walls, floors, ceiling, drains, windows, lighting) ▪ Well maintained equipment (Rails, platforms, trolleys, etc)	11 12 25 26						
4. Detention (DFI) facilities		**Comments**	**12**	**9**	**6**	**3**	**0**
• Adequate security measures in place. • Well maintained walls, floors, ceiling, drains, windows, lighting, etc) • Well maintained equipment (Rails, platforms, trolleys, etc)	6 (t) 11 12						
5. Freezer, chiller and dispatch area		**Comments**	**16**	**12**	**8**	**4**	**0**
• Well maintained chillers/freezers and dispatch facilities (walls, floors, ceiling, drains, windows, lighting, doors, etc) • Well maintained equipment (Rails, racks, docking seals, drip trays, air cooling units, etc) • Prescribed notices on doors maintained in a legible condition	28; 29; 39(2) 40(4)						
6. Offal Room and offal facilities		**Comments**	**8**	**6**	**4**	**2**	**0**
• Areas well maintained with adequate facilities to store material away from the floor. • Well maintained walls, floors, ceiling, drains, windows, lighting, etc) • Well maintained equipment (Rails, platforms, trolleys, etc)	11 12 30 32						
7. Change rooms / toilets		**Comments**	**14**	**11**	**7**	**3**	**0**
• Well maintained walls, floors, ceilings, windows, shower cubicles, drains, toilets, urinals, washbasins, etc. • Adequate facilities for number and categories of personnel as per design.	13						
8. Dining facilities		**Comments**	**8**	**6**	**4**	**2**	**0**
• Well maintained. • Adequate facilities for number and categories of personnel as per design.	6 (x)						
9. Office accommodation		**Comments**	**8**	**6**	**4**	**2**	**0**
• All separate from production areas • Adequate for number of inspection personnel.	6 (y) 6 (aa)						

CATEGORY I. Structural Requirements and Maintenance Score:_____

J. HYGIENE MANAGEMENT SYSTEM:

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
1. General requirements of HMS:		**Comments**	**10**	**8**	**5**	**2**	**0**
• List of potential hazards • Sampling program for laboratory analyses • Corrective action reports • HAS done • Code of conduct for personal hygiene • Documented product recall procedure	49 (b) 49 (c) 49 (d) 49 (e) 50(c) 53 55 (d) (i)						

2. Schematic Plans or Drawings		**Comments**	**6**	**5**	**3**	**1**	**0**
▪ All different areas ▪ All different rooms indicating process taking place, capacity, etc ▪ Flow of product ▪ Ancillary structures on premises ▪ Ablution facilities and personnel entrances ▪ All entrances to rooms, areas and buildings ▪ Boundaries, indicating entrances and exits to the premises ▪ Position of bait stations ▪ Temperature controlled areas ▪ Water distribution	51 55 (j) (i) 55 (n) (i) 55 (i) (ii)						

3. Flow diagrams of slaughter process showing:		**Comments**	**4**	**3**	**2**	**1**	**0**
▪ Product flow from receiving to dispatch ▪ Equipment lay-out ▪ Sequence of steps ▪ Technical parameters of operations ▪ Personnel routes ▪ Segregation of clean and dirty areas	52 (a) 52 (b)						

4. Hygiene Management Programs for:		**Comments**	**20**	**15**	**10**	**5**	**0**
▪ Ante mortem inspection ▪ Slaughter and Dressing ▪ Meat inspection ▪ Personal hygiene of workers ▪ Medical fitness of workers ▪ Sterilizers ▪ Soap, toilet paper and paper towels ▪ Sanitation and continuous cleaning ▪ Water quality and availability ▪ Vermin control ▪ Waste disposal (including condemned material) ▪ Contact wrapping and packaging material ▪ Maintenance of structures and equipment ▪ Thermo control	47 54 55						

5. Protocols approved by PEO for:		**Comments**	**4**	**3**	**2**	**1**	**0**
▪ Cutting of warm meat if done ▪ Loading of meat by informal traders ▪ Final washing of carcasses (addition of chemicals) ▪ Regaining of skins from dead animals if done ▪ Handling and treatment of cysticercosis carcasses ▪ Other methods of sterilization	14 (2) 34 (4) 45 (8) 77 (2) 81 (6) 105						

6. Standard Operational Procedures for:		**Comments**	**6**	**5**	**3**	**1**	**0**
▪ Emergency slaughter ▪ Preferential slaughter ▪ Provisional slaughter ▪ Controlled diseases ▪ "C" & "T" branded cattle ▪ Dirty animals ▪ Dropped meat ▪ Convey info from lairages to meat inspectors	55 (a) 55 (c) 79 (4) 82						

	Regulation Reference		EXCELLENT	GOOD	FAIR	POOR	CRITICAL
7. Traceability records per slaughter batch:		**Comments**	**10**	**8**	**5**	**2**	**0**
▪ Identity and origin of batch ▪ Date of slaughter ▪ Species slaughtered ▪ Mass ▪ Quantity ▪ Identification of carcasses ▪ Destination of carcasses and cut meat ▪ Records related to product recalls	50 (a) (b) (c)						

8. Training records:		**Comments**	**4**	**3**	**2**	**1**	**0**
▪ Slaughter procedures ▪ Personal hygiene ▪ Cleaning teams ▪ Persons working with poison (vermin control) ▪ Attendance registers of all training courses given	55 (b) (iii) 55(d) ii 55 (h) (vi) 55 (j) (iii) 55 (d) (ii) 63						

9. Sanitation records:		**Comments**	**6**	**5**	**3**	**1**	**0**
▪ Pre-production monitoring ▪ Technical/Data sheets with reference to use in meat plants, active ingredients, dilution rates and applications available for all chemicals ▪ Results of laboratory tests for efficacy of sanitation process ▪ Results of water quality tests	47 (5) 47 (2) (d) 47 (2) (e) 55 (h) (x)						

10. Personnel records:		**Comments**	**4**	**3**	**2**	**1**	**0**
▪ Initial medical certification (pre-employment) ▪ Daily fitness checks records ▪ All other medical records ▪ Supervisory surveillance and disciplinary actions	55 (e) (i) 55 (e) (ii) 57 (2) 55 (d) (iii)						

11. Thermo control records:		**Comments**	**12**	**9**	**6**	**4**	**0**
▪ Sterilizer temperatures ▪ Calibration and testing of recording equipment ▪ Cold room temperatures ▪ Daily control checks by Hygiene Manager ▪ Core temperatures of carcasses or meat cuts before dispatch ▪ Corrective action records of deviations	55 (f) 55 (n) (iv)(v) 55 (n) (iii) 55 (n) (xiii) 40 (1) (2) 55 (n) (x)						

12. Meat inspection records:		**Comments**	**10**	**8**	**5**	**2**	**0**
▪ Declaration of health & origin for animals received ▪ Daily slaughtering records ▪ Ante mortem inspection ▪ Primary meat inspection ▪ Secondary meat inspection ▪ Animal movement i.t.o. Act 35 of 1984 (red cross permits) ▪ Cysticercosis control ▪ Daily checking of carcasses for soiling	50 (b) 55 (b) (iv) 79 (2) 108, 85 (2 108 108 82 105 (8)						

13. Approval of HMS:		**Comments**	**4**	**3**	**2**	**1**	**0**
▪ HMS submitted to PEO ▪ HMS approved by PEO	49(a)						

CATEGORY J. Hygiene Management System Score:_____

HAS: - NON-CONFORMANCE, CORRECTIVE ACTION AND CLEARANCE REPORT

Abattoir_____ Date of audit _____ Evaluating official/s _____

Category	Regulation Ref	Details of non-conformance	Corrective action taken to prevent recurrence (To be completed by Hygiene Manager / Owner)	Priority	Proposed Date off completion	Verified by Prov. Inspector

Non-conformities should be prioritized and proposed dates of completion set accordingly (Only **critical and major** non-conformances should be listed).

Name of owner / manager: …….. Signature: …….. Date:……..

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Abattoir_____ Date of audit _____ Evaluating official/s _____

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